OMB Number: 2030-0020
Expiration Date: 06/30/2024

Preaward Compliance Review Report for All Applicants and Recipients Requesting EPA Financial Assistance

Note: Read Instructions before completing form.

I. A. Applicant/Recipient (Name, Address, City, State, Zip Code)

Name: Elisabeth Micheli

Address: 2130 Pepperwood Preserve Road

City: Santa Rosa

State: CA: California Zip Code: 95404-7534

B. DUNS No. 165986097

II. Is the applicant currently receiving EPA Assistance? ☐ Yes ☒ No

III. List all civil rights lawsuits and administrative complaints pending against the applicant/recipient that allege discrimination based on race, color, national origin, sex, age, or disability. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

n/a

IV. List all civil rights lawsuits and administrative complaints decided against the applicant/recipient within the last year that allege discrimination based on race, color, national origin, sex, age, or disability and enclose a copy of all decisions. Please describe all corrective actions taken. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

n/a

V. List all civil rights compliance reviews of the applicant/recipient conducted by any agency within the last two years and enclose a copy of the review and any decisions, orders, or agreements based on the review. Please describe any corrective action taken. (40 C.F.R. § 7.80(c)(3))

n/a

VI. Is the applicant requesting EPA assistance for new construction? If no, proceed to VII; if yes, answer (a) and/or (b) below.

☐ Yes ☒ No

a. If the grant is for new construction, will all new facilities or alterations to existing facilities be designed and constructed to be readily accessible to and usable by persons with disabilities? If yes, proceed to VII; if no, proceed to VI(b).

☐ Yes ☐ No

b. If the grant is for new construction and the new facilities or alterations to existing facilities will not be readily accessible to and usable by persons with disabilities, explain how a regulatory exception (40 C.F.R. 7.70) applies.

VII. Does the applicant/recipient provide initial and continuing notice that it does not discriminate on the basis of race, color, national origin, sex, age, or disability in its program or activities? (40 C.F.R 5.140 and 7.95)	☒ Yes	☐ No
a. Do the methods of notice accommodate those with impaired vision or hearing?	☒ Yes	☐ No
b. Is the notice posted in a prominent place in the applicant's offices or facilities or, for education programs and activities, in appropriate periodicals and other written communications?	☒ Yes	☐ No
c. Does the notice identify a designated civil rights coordinator?	☒ Yes	☐ No
VIII. Does the applicant/recipient maintain demographic data on the race, color, national origin, sex, age, or handicap of the population it serves? (40 C.F.R. 7.85(a))	☒ Yes	☐ No
IX. Does the applicant/recipient have a policy/procedure for providing access to services for persons with limited English proficiency? (40 C.F.R. Part 7, E.O. 13166)	☒ Yes	☐ No

X. If the applicant is an education program or activity, or has 15 or more employees, has it designated an employee to coordinate its compliance with 40 C.F.R. Parts 5 and 7? Provide the name, title, position, mailing address, e-mail address, fax number, and telephone number of the designated coordinator.

Lisa McCortney, Senior HR and Accounting Specialist, lmccortney@pepperwoodpreserve.org, fax707-591-9315, ph707-591-9310

XI. If the applicant is an education program or activity, or has 15 or more employees, has it adopted grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 C.F.R. Parts 5 and 7? Provide a legal citation or Internet Address for, or a copy of, the procedures.

Yes, Pepperwood's policy resides in the Employee Handbook, and the language at the end of this form, as this field didn't allow to paste in the full written policies.

For the Applicant/Recipient

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law. I assure that I will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized Official	B. Title of Authorized Official	C. Date
Elisabeth R Micheli	President & CEO	03/25/2022

For the U.S. Environmental Protection Agency

I have reviewed the information provided by the applicant/recipient and hereby certify that the applicant/recipient has submitted all preaward compliance information required by 40 C.F.R. Parts 5 and 7; that based on the information submitted, this application satisfies the preaward provisions of 40 C.F.R. Parts 5 and 7; and that the applicant has given assurance that it will fully comply with all applicable civil rights statures and EPA regulations.

A. *Signature of Authorized EPA Official	B. Title of Authorized Official	C. Date

*** See Instructions**

Instructions for EPA FORM 4700-4 (Rev. 06/2014)

General. Recipients of Federal financial assistance from the U.S. Environmental Protection Agency must comply with the following statutes and regulations.
Title VI of the Civil Rights Acts of 1964 provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. The Act goes on to explain that the statute shall not be construed to authorize action with respect to any employment practice of any employer, employment agency, or labor organization (except where the primary objective of the Federal financial assistance is to provide employment). Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act provides that no person in the United States shall on the ground of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under the Federal Water Pollution Control Act, as amended. Employment discrimination on the basis of sex is prohibited in all such programs or activities. Section 504 of the Rehabilitation Act of 1973 provides that no otherwise qualified individual with a disability in the United States shall solely by reason of disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. Employment discrimination on the basis of disability is prohibited in all such programs or activities. The Age Discrimination Act of 1975 provides that no person on the basis of age shall be excluded from participation under any program or activity receiving Federal financial assistance. Employment discrimination is not covered. Age discrimination in employment is prohibited by the Age Discrimination in Employment Act administered by the Equal Employment Opportunity Commission. Title IX of the Education Amendments of 1972 provides that no person in the United States on the basis of sex shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance. Employment discrimination on the basis of sex is prohibited in all such education programs or activities. Note: an education program or activity is not limited to only those conducted by a formal institution. 40 C.F.R. Part 5 implements Title IX of the Education Amendments of 1972. 40 C.F.R. Part 7 implements Title VI of the Civil Rights Act of 1964, Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act, and Section 504 of The Rehabilitation Act of 1973. The Executive Order 13166 (E.O. 13166) entitled; "Improving Access to Services for Persons with Limited English Proficiency" requires Federal agencies work to ensure that recipients of Federal financial assistance provide meaningful access to their LEP applicants and beneficiaries.

Items "Applicant" means any entity that files an application or unsolicited proposal or otherwise requests EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Recipient" means any entity, other than applicant, which will actually receive EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Civil rights lawsuits and administrative complaints" means any lawsuit or administrative complaint alleging discrimination on the basis of race, color, national origin, sex, age, or disability pending or decided against the applicant and/or entity which actually benefits from the grant, but excluding employment complaints not covered by 40 C.F.R. Parts 5 and 7. For example, if a city is the named applicant but the grant will actually benefit the Department of Sewage, civil rights lawsuits involving both the city and the Department of Sewage should be listed. "Civil rights compliance review" means any review assessing the applicant's and/or recipient's compliance with laws prohibiting discrimination on the basis of race, color, national origin, sex, age, or disability. Submit this form with the original and required copies of applications, requests for extensions, requests for increase of funds, etc. Updates of information are all that are required after the initial application submission. If any item is not relevant to the project for which assistance is requested, write "NA" for "Not Applicable." In the event applicant is uncertain about how to answer any questions, EPA program officials should be contacted for clarification. * Note: Signature appears in the Approval Section of the EPA Comprehensive Administrative Review For Grants/Cooperative Agreements & Continuation/Supplemental Awards form.

EPA KEY CONTACTS FORM

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Authorized Representative: *Original awards and amendments will be sent to this individual for review and acceptance, unless otherwise indicated.*

Name: Prefix: Dr. First Name: Elisabeth Middle Name:
Last Name: Micheli Suffix:

Title: President and CEO

Complete Address:

Street1: 2130 Pepperwood Preserve Road
Street2:
City: Santa Rosa State: CA: California
Zip / Postal Code: 95404-7534 Country: USA: UNITED STATES

Phone Number: 7073605536 **Fax Number:**

E-mail Address: lmicheli@pepperwoodpreserve.org

Payee: *Individual authorized to accept payments.*

Name: Prefix: First Name: Jim Middle Name:
Last Name: Elias Suffix:

Title: Finance and Operations Manager

Complete Address:

Street1: 2130 Pepperwood Preserve Road
Street2:
City: Santa Rosa State: CA: California
Zip / Postal Code: 95404-7534 Country: USA: UNITED STATES

Phone Number: 7079337551 **Fax Number:**

E-mail Address: jelias@pepperwoodpreserve.org

Administrative Contact: *Individual from Sponsored Programs Office to contact concerning administrative matters (i.e., indirect cost rate computation, rebudgeting requests etc).*

Name: Prefix: First Name: Jim Middle Name:
Last Name: Elias Suffix:

Title: Finance and Operations Manager

Complete Address:

Street1: 2130 Pepperwood Preserve Road
Street2:
City: Santa Rosa State: CA: California
Zip / Postal Code: 95404-7534 Country: USA: UNITED STATES

Phone Number: 7079337551 **Fax Number:**

E-mail Address: jelias@pepperwoodpreserve.org

EPA KEY CONTACTS FORM

Project Manager: *Individual responsible for the technical completion of the proposed work.*

Name: Prefix: Dr. First Name: Elisabeth Middle Name:

Last Name: Micheli Suffix:

Title: President and CEO

Complete Address:

Street1: 2130 Pepperwood Preserve Road

Street2:

City: Santa Rosa State: CA: California

Zip / Postal Code: 95404-7534 Country: USA: UNITED STATES

Phone Number: 7073605536 **Fax Number:**

E-mail Address: lmicheli@pepperwoodpreserve.org

Project Narrative File(s)

*** Mandatory Project Narrative File Filename:** 1239-EPA_AQ_Proposal_Narrative_2022.pdf

Add Mandatory Project Narrative File | Delete Mandatory Project Narrative File | View Mandatory Project Narrative File

To add more Project Narrative File attachments, please use the attachment buttons below.

Add Optional Project Narrative File | Delete Optional Project Narrative File | View Optional Project Narrative File

OMB Number: 4040-0004
Expiration Date: 12/31/2022

Application for Federal Assistance SF-424

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received: 03/25/2022

4. Applicant Identifier:

5a. Federal Entity Identifier: 01-0817571

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: Pepperwood Foundation

* b. Employer/Taxpayer Identification Number (EIN/TIN): 01-0817571

* c. Organizational DUNS: 1659860970000

d. Address:

* Street1: 2130 Pepperwood Preserve Road
Street2:
* City: Santa Rosa
County/Parish: Sonoma
* State: CA: California
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 95404-7534

e. Organizational Unit:

Department Name:

Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: Dr.
* First Name: Elisabeth
Middle Name:
* Last Name: Micheli
Suffix:

Title: President & CEO

Organizational Affiliation: Pepperwood Foundation

* Telephone Number: 707-360-5536
Fax Number:

* Email: lmicheli@pepperwoodpreserve.org

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

M: Nonprofit with 501C3 IRS Status (Other than Institution of Higher Education)

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.034

CFDA Title:

Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act

*** 12. Funding Opportunity Number:**

EPA-OAR-OAQPS-22-01

* Title:

Enhanced Air Quality Monitoring for Communities

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: CA-002 * b. Program/Project: CA-002

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 11/01/2022 * b. End Date: 10/31/2024

18. Estimated Funding ($):

* a. Federal	499,347.00
* b. Applicant	0.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	499,347.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: Dr. * First Name: Elisabeth

Middle Name:

* Last Name: Micheli

Suffix:

* Title: President & CEO

* Telephone Number: 707-360-5536 Fax Number:

* Email: lmicheli@pepperwoodpreserve.org

* Signature of Authorized Representative: Elisabeth R Micheli * Date Signed: 03/25/2022

BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 02/28/2022

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Enhanced Air Quality Monitoring for Communities	66.034	$	$	$	$ 499,347.00	$ 499,347.00
2.						
3.						
4.						
5. Totals		$	$	$	$ 499,347.00	$ 499,347.00

Standard Form 424A (Rev. 7- 97)
Prescribed by OMB (Circular A -102) Page 1

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1) Enhanced Air Quality Monitoring for Communities	(2)	(3)	(4)	Total (5)
a. Personnel	$ 71,347.00	$	$	$	$ 71,347.00
b. Fringe Benefits	14,062.00				14,062.00
c. Travel	439.00				439.00
d. Equipment	58,500.00				58,500.00
e. Supplies					
f. Contractual					
g. Construction					
h. Other	309,604.00				309,604.00
i. Total Direct Charges (sum of 6a-6h)	453,952.00				$ 453,952.00
j. Indirect Charges	45,395.00				$ 45,395.00
k. TOTALS (sum of 6i and 6j)	$ 499,347.00	$	$	$	$ 499,347.00
7. Program Income	$	$	$	$	$

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SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8.	$	$	$	$
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	$	$	$	$

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 328,608.00	$ 136,527.00	$ 64,027.00	$ 64,027.00	$ 64,027.00
14. Non-Federal	$				
15. TOTAL (sum of lines 13 and 14)	$ 328,608.00	$ 136,527.00	$ 64,027.00	$ 64,027.00	$ 64,027.00

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS) (b)First	(c) Second	(d) Third	(e) Fourth
16. Federal Year 2	$ 32,014.00	$ 32,014.00	$ 32,014.00	$ 32,014.00
17. Federal Year 3	10,671.00	10,671.00	10,671.00	10,671.00
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	$ 42,685.00	$ 42,685.00	$ 42,685.00	$ 42,685.00

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges:

22. Indirect Charges: De minimus rate of 10%

23. Remarks:

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Department of the Treasury
Internal Revenue Service
Tax Exempt and Government Entities
PO Box 2508
Cincinnati, OH 45201

Date: MAR 23 2016

PEPPERWOOD FOUNDATION
2130 PEPPERWOOD PRESERVE ROAD
SANTA ROSA, CA 95404

Employer ID number:
01-0817571
Person to contact / ID number:
HILLARY MOON
ID# 0203120
Contact telephone number:
1-877-829-5500
Form 990/990-EZ/990-N required:
Yes

Dear Applicant:

In your letter dated September 25, 2015, you requested reclassification of foundation status as a public charity.

Our records indicate you are tax exempt under IRC Section 501(c)(3). You're currently classified as a public charity described in IRC Section 509(a)(3).

Based on the information you provided, we determined you meet the requirements for classification as a public charity described in IRC Sections 509(a)(1) & 170(b)(1)(A)(vi).

Because your tax-exempt status wasn't under consideration, you continue to be classified as an organization exempt from federal income tax under IRC Section 501(c)(3).

This letter could help resolve questions on your foundation status. Keep it for your records.

We sent a copy of this letter to your representative as indicated in your power of attorney.

Sincerely,

Jeffery I. Cooper
Director, Exempt Organizations
Rulings and Agreements

Manifest for Grant Application # GRANT13580603

Grant Application XML file (total 1):

1. GrantApplication.xml. (size 25526 bytes)

Forms Included in Zip File(total 6):

1. Form ProjectNarrativeAttachments_1_2-V1.2.pdf (size 16021 bytes)

2. Form SF424_3_0-V3.0.pdf (size 24172 bytes)

3. Form SF424A-V1.0.pdf (size 22870 bytes)

4. Form EPA4700_4_3_0-V3.0.pdf (size 22903 bytes)

5. Form OtherNarrativeAttachments_1_2-V1.2.pdf (size 15903 bytes)

6. Form EPA_KeyContacts_2_0-V2.0.pdf (size 37268 bytes)

Attachments Included in Zip File (total 6):

1. ProjectNarrativeAttachments_1_2 ProjectNarrativeAttachments_1_2-Attachments-1239-EPA_AQ_Proposal_Narrative_2022.pdf application/pdf (size 707586 bytes)

2. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1234-22-06-09 IRS 501c3 letter.pdf application/pdf (size 33134 bytes)

3. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1237-EPA_AQ_PartnerLetters_Pepperwood_2022.pdf application/pdf (size 2849783 bytes)

4. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1238-EPA_AQ_Pepperwod_QAStatement_2022.pdf application/pdf (size 61240 bytes)

5. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1235-EPA_AQ_CVs_Pepperwood_2022.pdf application/pdf (size 2336435 bytes)

6. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1236-EPA_AQ_CommunitySet-Aside_Pepperwood_2022.pdf application/pdf (size 4013634 bytes)

Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions

Quality Assurance Statement

The Project Partners will collaboratively establish and operationalize a continuous project Quality Assurance Plan, led by USRA, for the full duration of the proposed project in three phases:

1. **Planning**: Led by the TAC chair, Dr. Sorek-Hamer, the Clarity team will develop a QA plan jointly with Breeze Technologies and the project TAC and partners to ensure the quality and robustness of the output data. This includes identification of appropriate co-location sites (including active ones), characterization/review of proposed sensor locations, and agreement on key metrics required for QC.
2. **Implementation**: The project team will work jointly to implement the QA plan, including setting up co-locations with the one local regulatory FRM monitor and Breeze Technologies monitors. USRA and BAERI researchers will develop in collaboration with Clarity and Breeze Technologies a regionally-specific calibration model for the collected data to optimize co-location performance with the local reference monitor. These correction factors will be applied to the data in real-time on a high temporal resolution basis. The Clarity Dashboard will provide information about ongoing calibration and sensor performance and continuous support will be available from the project management team.
3. **Assessment**: Assessment of sensor network metrics and calibration performance will be done by USRA and BAERI using agreed-upon metrics that will be defined within the TAC activity.

Quality Control (QC) Activities:
The project team will work to jointly define QC activities to ensure adequate data quality, including developing logic for QA/QC flags which can be used to filter out outliers due to invalid data, leveraging logic integrated into Clarity's base dashboard. We will work in collaboration with Clarity to develop additional QA/QC procedures to further ensure data are of adequate quality to support the project goals. Many of these planned additions, including refining device status and the addition of automatic QA/QC flags, will be completed during the project timeline. In both technologies, we will integrate their respective wildfire correction models in order to provide not only PM2.5 concentrations but also a measure for the presence of wildfire smoke. This process and results will be communicated with the TAC and Robert Bamford at the Northern Sonoma Air District.

QA/QC Team:

- **Dr. Sorek-Hamer** (USRA) has extensive experience with air quality project management, modeling and big data analysis, e.g. from NASA, EPA, NCAR.
- **Dr. Segal Rozenheimer** (BAERI) is highly experienced with air quality sensors and data analysis for airborne missions and ground campaigns
- The Clarity project team includes **Dr. Meiling Gao** (Chief Operating Officer), who has extensive experience managing low-cost network sensors across the world. **Katie Moore, MPH** (Environmental Project Manager), has supported management of large and small-scale air quality networks with a focus on environmental justice and community-led monitoring efforts. **Levi Stanton** (Lead Solutions Engineer) has demonstrated expertise developing robust calibration methodologies and has led numerous projects funded by the U.S. Environmental Protection Agency using low-cost sensors across the world.

I. Cover Page

TITLE: Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions

APPLICANT INFORMATION:

Pepperwood Foundation, 2130 Pepperwood Preserve Rd, Santa Rosa, CA, 95404
Elisabeth Micheli, PhD, 707-360-5536, lmicheli@pepperwoodpreserve.org
DUNS: 3165986097

SET-ASIDE: Community-Based Organization Set-Aside for Northern Sonoma County, CA

BRIEF DESCRIPTION OF TECHNICAL APPLICANT ORGANIZATION: Pepperwood is a leader in forging solutions to advance the health of the North Bay's local communities and the land, water, and wildlife they rely upon for their well-being. Pepperwood's Dwight Center for Conservation Science serves as a venue for bringing community and science together to craft solutions to our greatest place-based environmental challenges.

PROJECT PARTNERS:

- **Universities Space Research Association (USRA):** Meytar Sorek-Hamer, PhD, **Co-Investigator** and Chair of Technical Advisory Committee (TAC)
- **Soluna Outreach Solutions and LatinX Hub:** Hugo Mata, **Co-Investigator** and Community Leader and Outreach Facilitator for Community Engagement Working Group
- **Citizens Organized to Prepare for Emergencies (COPE):** Priscilla Abercrombie, Community Engagement
- **Nuestra Comunidad:** Alma Bowen, Community Engagement
- **North Bay Jobs with Justice:** Max Bell Alper, Community Engagement
- **Bay Area Environmental Research Institute (BAERI):** Michal Segal-Rozenheimer, PhD, TAC, Sensor Network Design and Data Analysis
- **Northern Sonoma County Air Pollution Control District (NoSoCoAir)**: Robert Bamford, TAC
- **Sonoma Technology, Inc:** Abhilash Vijayan, PhD, PE and Hilary Hafner, TAC
- **Clarity Movement:** Sean Wihera, Air quality Sensors, Community Dashboard

PROJECT LOCATION: Northern Sonoma County, CA, centered around 95404
AIR POLLUTANT SCOPE: The focus of the application is Particulate Pollution and smoke.
BUDGET SUMMARY:

EPA Funding Requested	Total Project Cost
$499,347	**$499,347**

PROJECT PERIOD: 11/1/2022 - 10/31/2025
SHORT PROJECT DESCRIPTION: This proposal will empower members of Northern Sonoma County's large LatinX population and local seniors (including seniors with disabilities) to benefit from recent advances in cost-effective air quality sensor networks in the face of increasingly intense seasonal wildfire smoke impacts. Pepperwood and partner organizations will engage members of these at-risk populations to assess their needs and increase the extent, availability and accuracy of air quality data in rural areas by adding sensors to an existing fire and flood situational awareness network. This work will fill critical air quality data gaps and boost existing environmental justice efforts to leverage data and co-create bi-lingual outreach materials to mitigate potential health impacts during extreme wildfire smoke air quality events.

II. Workplan

Section 1 – Project Summary and Approach

During the recent "mega" wildfire seasons hitting California, wildfire smoke and ash has become a widespread threat to rural and urban communities ranging up to hundreds of miles away from active wildfire perimeters. Vulnerable communities presently face significant barriers to accessing air quality sensor technology, data, and educational resources, yet they are perhaps most at risk from increasing wildfire-related air quality impacts. The seniors that we are serving through this project primarily reside in Healdsburg and Cloverdale-Geyserville, a geography that represents nearly 12,000 geographically-isolated seniors across urban and rural dwellings (Aging and Living Well in Sonoma County). This proposal will empower members of our large LatinX population and local seniors–many of whom are mobility- and technology-limited–to benefit from recent advances in cost-effective air quality sensor networks. We will work with these targeted populations in the community of Northern Sonoma County to fill critical air quality data gaps and to leverage that data to boost awareness of how to mitigate potential health impacts during extreme air quality events.

This project will increase the availability and accuracy of air quality data in areas with limited or no air quality sensors. Pepperwood will add sensors to an existing fire and flood situational awareness network developed as part of its Sentinel Site with the USGS and Sonoma Water in partnership with air quality experts at USRA and the Northern Sonoma County Air Pollution Control District. We will add air quality sensors to this existing communications network based on a structured engagement of vulnerable community members in partnership with local service organizations led by local LatinX leaders including Hugo Mata from Soluna Outreach Solutions and co-founder of Red LatinX Hub.

We will demonstrate how empowering environmental justice (EJ) communities to use emerging low-cost sensor networks can protect vulnerable individuals and can be scaled up across the state of California and beyond. We will first work within surrounding communities to place new sensors in inland valleys of Northern Sonoma County, in areas where people work and at senior housing facilities. We will then work with the communities to translate the data into bi-lingual and visual formats that will empower and inform people on how they can take action to mitigate exposure to severe air quality events. We will bring educational resources to the "promotores" model with peer-to-peer outreach programs, including those serving local farmworkers, to integrate this curriculum into their outreach and provision of protective equipment. We will work with Citizens Organized to Prepare for Emergencies (COPE) and Nuestra Comunidad to integrate these data resources into their "Smoke Ready" curriculum delivered via in-person outreach.

We will co-create meaningful ways to communicate this information across the "digital divide," framing strategies to share this information using means comfortable for members of vulnerable communities. This pilot will entail designing an outreach package and testing it out with the community to support the next phase of roll-out to reach a larger audience across the North Coast/North Bay region and beyond.

A. Overall Project

We are partnering community leaders with technical advisors to engage populations currently underrepresented by air quality data services and air pollution event response education. Our approach entails three steps to co-create a community-driven sensor system that feeds accessible and relevant guidance to help keep the Northern Sonoma County underserved communities safe and informed.

Step 1: Conduct Community Needs Assessment. Engagement of vulnerable populations and elevating the voices of EJ communities are essential to this project. We will achieve this by partnering with the leadership of several well-established service organizations (see partner descriptions) to serve on a Community Engagement working group with the facilitation of a seasoned Outreach Specialist (Soluna). We will utilize focus groups and structured surveys to identify community air quality (AQ) concerns, needs, sensitivities, level of awareness, and geographic priorities. Our Outreach Specialist will provide transcription and translation for all community engagements, which will result in thorough documentation for application to next steps.

Step 2: Measure fine particulate matter. Based on community input from Stage 1, a new community AQ network measuring fine particulate matter (PM2.5) and smoke, will be designed and deployed in two tiers using commercially available technologies. Collecting data continuously, including during extreme wildfire events, and during the prescribed fire season, both of which are prominent in this region, will empower the

local communities and stakeholders to have better knowledge of the local AQ that will guide them to take appropriate actions.

Stage 3: **Co-create an AQ dashboard and visualizations.** Once the sensor is in place, we will co-create an open access bi-lingual (English and Spanish) user-friendly dashboard based on the Clarity dashboard, including data management, data analysis, and visualizations, for community access and decision making. We will develop materials that can cross the "digital divide," using not just mobile apps for those who have access to smartphones, but also employing the "promotores" model and other in-person trust-building and educational engagements, as demonstrated by disaster preparedness leaders at Nuestra Comunidad. We will expand and translate a "Smoke Ready" curriculum developed by COPE's public health specialists with clear and basic steps vulnerable communities can take to reduce the health hazards associated with the kinds of extreme smoke events detected by the new network. In addition, we will integrate our training modules into the leadership capacity-building program sponsored by North Bay Jobs with Justice utilizing a peer-to-peer model to reach farmworkers where they work during wildfire events to support outdoor labor forces.

We will achieve this approach by organizing this project into four overlapping tasks proceeding in parallel across the 36-month project window:

Task 1: Project Management. At project launch, we will finalize contracts and generate a detailed work plan, jointly developed and confirmed with all project partners. We will conduct a total of approximately 20 project management meetings over the course of this project to include the project manager, the project analyst, and the leaders of the Community Engagement and Technical working groups. As required, we will conduct invoicing and generate reports regarding project progress. At the close of the project, we will document project methods and outcomes including a Final Narrative Report and Financials.

Task 2: Community Outreach and Engagement. We will design a community engagement plan in partnership with our Outreach Specialist, who will facilitate the project's Community Engagement working group. We will conduct two rounds of focus groups engaging LatinX and senior individuals. We will also conduct a community survey via deployment at large community events, like the Cloverdale Citrus Fair. We will develop translation and visual interpretation for COPE's Smoke Ready Curricula to translate materials from English to Spanish. We will integrate air quality data gathered by the community into a data dashboard that will be used as a dissemination and sharing tool. Pepperwood and partners will conduct outreach through electronic news, a blog, and other media. The final deliverable will be a documented and piloted outreach package tested with our community and available for dissemination and roll out at larger geographic scales.

Task 3: Technical Advisory Committee (TAC) Engagement. The TAC will include participants from leading technology and research organizations, such as Sonoma Technology, Clarity Movement, BAERI and USRA, including the Northern Sonoma County Air District. We will finalize participants and develop the TAC Workplan in the first stage of the project. The TAC will provide professional guidance and set milestones related to the AQ sensor network design, installation, troubleshooting, measuring, data management, data analysis, and accessible dashboard for the communities' use. The TAC will conduct six quarterly meetings throughout the project. The TAC's final sensor plan will be a deliverable.

Task 4a: Sensor Network Design and Installation and 4b. Data Analysis, Management, and Dashboard Integration. To empower the LatinX community and the seniors in this region, we will develop a community-based AQ network that will include mid-range sensors with high performance validation. To gather data, we are deploying two tiers of air quality measuring technology:

Technology Tier 1: Three advanced Breeze Technologies sensors will be deployed at fixed remote locations collocated within the USGS Long Range Radio communication module (LoRa) gateways' range to provide continuous data on PM2.5 concentrations and early smoke detection warnings. These sensors are capable of measuring Temperature, Humidity, Carbon Monoxide (CO), Carbon Dioxide (CO2), Ammonia (NH3), Nitric Oxide (NO), Nitrogen Dioxide (NO2), Ozone (O3), Sulfur Dioxide (SO2), and Volatile Organic Compounds (VOCs) in addition to Particulate Matter (PM10 and PM2.5). Breeze Technologies produce top-tier sensors vetted by the Department of Homeland Security. We will focus on the particulate matter and smoke detection capabilities of these sensors with an option to obtain data on other pollutants based on the community engagement activities and TAC guidance.

Technology Tier 2: Twenty Clarity nodes will be deployed outdoors to measure PM2.5 concentrations for communities which currently lack AQ measuring as well as access to bi-lingual near-real-time AQ data. Three Clarity nodes will be collocated with the fixed near-LoRa gateways sites (Tier 1) for calibration purposes and the remaining 17 nodes will be installed in the community designed network taking into account the locations of interest, i.e. outdoor working environments, senior housing, remote housing facilities, the physical mounting location, and the current monitoring efforts in the region. The exact locations for each sensor will be defined with the community and TAC as part of the project tasks (Table 2). Clarity Node-S is a commercially available low-cost air measuring solution in use in over 65 countries and has been evaluated by several regulatory agencies, including the U.S. EPA, the South Coast Air Quality Management District's AQ-SPEC Program (U.S.) and the 2019 Airparif AirLab Microsensor Challenge (France). Clarity Nodes also support add-on modules for wind, ozone and black carbon measurement and are well calibrated to wildfire event situations, to bring even more flexibility at greater scale. The raw data from each Node-S is calibrated using regional or project-specific models developed by Clarity's air quality experts to ensure high accuracy and comparability to local regulatory monitoring (U.S. EPA FEM/FRM). USRA will oversee the following subtasks: coordinate the acquisition of sensors with vendors based on preliminary quotes; obtain permissions to install sensors from community partners and the Northern Sonoma County Air Pollution Control District; deploy the sensor network; test and conduct ongoing maintenance and management of the sensor network with vendors.

To meet data management and analysis objectives, we will obtain the raw data from the sensor network through the vendor's APIs to assure quality and accuracy, with the only FRM in the region as our calibration point and the high-end Breeze Technologies sensors as the second Tier calibration source (QA/QC details in Section 5). We will work with the Clarity team and provide them with our data analysis including temporal and spatial trends we observe in the data. The data analysis results will be presented at the TAC meetings and provide a basis for discussion, decision-making and action items for the team as well as for the community partners. Data analysis and management will be led by USRA in collaboration with Breeze Technologies and Clarity Movement. The Clarity Dashboard is a private air quality data visualization and management web app. Users can manage air quality measuring systems and view, plot, and download current and historical raw and calibrated data. We will work with Clarity to adapt their existing dashboard to fit our community needs in terms of presented language and simplicity of visualizations. In support of broader impact, USRA will also integrate the air quality sensor data into USRA's high performance computing testbed for environmental data sciences, to enable additional researchers and educators to have access to the data for complementary research and education activities. Our long-term goal is to have this unique dataset integrated into the EPA website (fire.airnow.gov) leveraging the current AQ network that incorporates data from EPA regulatory AQ monitoring sites as well as data from low-cost air sensors as part of a pilot project between the EPA and the U.S. Forest Service (USFS). This 2020 pilot project aimed to provide additional information on air quality during wildfires, especially in areas where regulatory monitors may not exist.

B. Project Significance

Recent wildfires and floods have had a devastating physical and emotional impact on the local community. According to A Portrait of Sonoma County, the October 2017 Sonoma Complex Fires "consumed more than 5,300 homes" and "traumatized people across the county." Two years later, the Kincade Fire led to the largest evacuation in county history, forcing approximately 40% of the population to leave their homes. Then, in 2020, the community was further damaged by the Glass Fire, Wallbridge/Meyers Fires, and the onset of the COVID-19 pandemic. The Portrait of Sonoma County states, these forces changed "Sonoma County residents' lives almost beyond recognition, leading to displacement, job loss, educational disruption, significant mental health challenges, and increased deaths due not just to the coronavirus but also to drug overdose." Our goal is to mitigate some of these pressures by reinforcing the community-building efforts of residents across the county.

Given the increasing exposure of North Coast communities to smoke–both from catastrophic wildfires and from smoke generated by prescribed burns–this project shines a light on the need to fill air quality data gaps and to engage vulnerable communities in efforts that will provide direct positive impacts to their health. Currently, the only regulatory air quality sensor in Sonoma County, CA is located near the City of Sebastopol located in West County. Talking with local community leaders highlights the importance of participating in a

knowledge exchange with members of underserved populations to ensure that their needs drive the development of the air quality measuring network for their communities. Project partners have identified a need for practical tools to measure air quality, the need for residents of vulnerable populations to understand how to access tools, and the need to develop practical ways these populations can reduce exposure to poor air in everyday life. The only way that a project like this can truly succeed is for science-based partners to engage with community partners from the beginning.

Before the COVID-19 era, Cardiovascular diseases were the number one cause of death in the world[1]. Exposure to air pollution containing PM2.5 is closely associated with cardiovascular disease. Both the World Health Organization (WHO) and the IHME's Global Burden of Disease study resources (2019) showed that 4.2 million deaths every year occur as a result of exposure to ambient (outdoor) air pollution. Air pollution is well recognized as a major risk factor for chronic non-communicable diseases and has been estimated to contribute more to global morbidity and mortality than all other known environmental risk factors combined[2,3]. On top of that, Northern Sonoma county is strongly affected by wildfire and prescribed burning smoke especially since 2017[4]. Exposure to wildfire smoke has been found to have adverse health effects, especially on elderly, vulnerable, and LatinX populations with repeated exposures[5,6]. Current knowledge on regulatory air quality is communicated to the population mainly through the EPA websites (e.g. fire.airnow.gov, which has only an English platform). This AQ platform is based on regulatory AQ monitors that are very limited in the Northern Sonoma County region (i.e. one FRM monitor at Sebastopol) with some additional low-cost purple air sensors. The population living and working in the Northern and Eastern parts of the county have limited local measurements on the air that they breathe and mostly rely on models that are limited with their validation capacity. According to the American Community Survey, in 2019, there were nearly 500K people living in Sonoma County, of which 21% are age 65 or above and 27% are Hispanic or LatinX. Since 1944, this region has been highly impacted by wildfires and prebscribed burning activities with very large and destructive fires over the past 5 years (e.g. 2017-NUNS, TUBBS; 2019 - KINCADE; 2020 - GLASS). Language barriers for Spanish speakers, technology, and mobility limitations interfere with residents' ability to understand the potential health effects of living in an environment highly impacted by wildfire.

Northern Sonoma County is equipped with one EPA Federal Reference Method (FRM) AQ monitor at Sebastopol that provides reliable AQ data on particulate matter concentrations to the district. In recent years low-cost (Purple air Plantower based) sensors have been deployed in the region to provide further data sources to the community. While the sensors are well populated around the city centers as Santa Rosa, there is a spatial gap remaining in the Northern and Eastern portions of Sonoma County Air Pollution Control District that we are targeting in this proposed project where no regulatory AQ monitors exist and there are limited low-cost near real-time AQ measuring systems. In particular, our community partners have identified a gap in availability of data and its communication to local residents, particularly sensitive seniors and outdoor (primarily vineyard) workers.

These communities are eager to have access to more information regarding their local AQ, to be empowered and to understand how to act in certain situations (e.g. purchase air purifiers, consider evacuation before the urgent messaging from the authorities comes in, data-to-action on a daily basis related to AQ levels). Therefore, we want to provide them with a new source of AQ data, a user-friendly platform that will not only be bi-lingual but will address community communication needs. We aren't able to control the wildfires in this region, but we will be able, in collaboration with the regional air district, to provide an early detection warning based on the new technology we will deploy as part of this project, in remote locations that currently have no AQ sensors deployed. From Stage 1, we will be working with an outreach coordinator that will provide communication strategies for engaging the potential communities in this area: conducting focus groups, sending out a survey to understand their needs, and providing them with training on the new platform and datasets. We will have students, guided by our community partner organizations, reaching out to rural communities to ensure accessibility. This project will enable underserved communities to measure their own air quality and to promote a partnership between the communities and local governments that leverages existing air quality monitoring expertise; gives the community a voice in the measuring of their air quality; and

most importantly, builds a foundation of trusting relationships and enhanced understanding from which sustainable solutions to the community air pollution problems can be found.

Section 2 – Community Involvement

A. Community Partnerships

As the goal of this project is to elevate the voices of EJ communities in defining air quality data collection needs and applications, we have assembled a strong team of EJ leaders representing at-risk seniors and LatinX populations, including farmworkers and other outdoor workers, who are at the front lines of the climate-wildfire crisis. Our Community Engagement Working Group will be chaired by Outreach Specialist Hugo Mata at Soluna. Mata is an experienced community leader with over 15 years specializing in bi-lingual (English/Spanish) environmental outreach programs and media planning and placement. Mata has deep roots in the community, including existing collaborations with many of our partners, and co-chairs the Latino Climate Leaders on Climate Change, which will hold an annual summit at Pepperwood this year. Mata will convene with our Community leaders and will co-produce focus groups and surveys with their direction and collaboration around participant recruitment from their constituents and provision of comfortable facilities.

The team members selected for this project bring targeted areas of expertise. Partners with established relationships with the populations we seek to serve by this project include **Nuestra Comunidad**, dedicated to providing disaster preparedness to the community with an emphasis on bi-lingual Spanish/English services; **North Bay Jobs with Justice (NBJwJ)**, dedicated to bringing equity to the workforce that works directly with farmworker leadership development; and **Citizens Organized to Prepare for Emergencies (COPE)**, dedicated to disaster preparedness with an emphasis on public health needs for senior and disabled communities. Each of these partners will participate in the development of strategy for both outreach with community members and the design of an air quality pilot program. Their constituents will directly benefit from this work through engagement activities based on community empowerment, access to new tools to address a critical public health issue, and incentives for residents to participate in this project. All partners will benefit from developing or reinforcing relationships between other community and technical organizations within our geography. Partners have expressed great enthusiasm about linking their objectives with a team designed to highlight a significant underserved community need. Pepperwood is committed to maintaining these relationships far beyond this three-year pilot, with a focus on maintaining this collaboration and fundraising for a full roll out of this program across Sonoma County and beyond.

B. Community Engagement

This project builds on over a decade of relationship-building between Pepperwood and our community. Pepperwood is perceived as a non-partisan, science-based source of information. The partners assembled here have been part of a loose alliance of community-serving organizations that are bridging equity, economics, housing, and the environment in a regional process of emerging from programmatic silos to recover and rebuild from recent disasters in a more collaborative and resilient way. We recently engaged with these partners in the MAP OneSonoma collaboration hosted by Community Foundation Sonoma County and United Way (our introduction to Nuestra Comunidad and NBJwJ), Community Wildfire Protection Planning (our first collaboration with COPE), and participation in the Latino Leaders on Climate Change team, co-chaired by Mata at Soluna.

The development of our strategy outlined in Task 2: Community Outreach and Engagement reflects the feedback on how to make our engagement efforts more effective. Engagement works best when partners are brought in at the beginning of the project and when community members can participate from the places they already spend their time. For that reason, we are partnering with trusted community providers: COPE to organize focus groups and other engagement activities at local senior centers that they already have relationships with, and Nuestra Comunidad and NBJwJ to connect with LatinX and farmworker communities at locations varying by season and community social calendars.

Our Community Engagement Working Group will coordinate focus groups that provide in-depth perspectives regarding community needs and evaluations of proposed products. Participants will receive

stipends to cover expenses associated with transportation and childcare. Food will be provided at all community events, and events will take place at familiar service provider venues. All host organizations will also receive honoraria for their efforts. Community surveys will be co-created by project partners to allow the accumulation of a greater data set. Beloved community events where these groups gather with families–such as May Day, the Citrus Fair, and County Fairs–expand our data set to gauge awareness among the larger community.

The results of this project will be incorporated into an open access, bi-lingual (English and Spanish) user-friendly dashboard based on the Clarity dashboard. Midway through our project timeline, our team will design a leadership capacity-building program in partnership with NBJwJ to teach users how to understand and utilize this dashboard. Additional public outreach of our final report will be deployed by Pepperwood through ENews, a blog, and other media promotion. The long-term three-year commitment of structured engagement allows us to co-create a pilot program that will go deep with partners, ensures Pepperwood and technical staff have an opportunity to truly experience an exchange of knowledge with community partners and ensures partner needs are met. All project partners are committed to realizing the full project, moving from pilot design through this program to the eventual roll out of full program implementation and dissemination.

C. Community-Based Organization Set-Aside

Pepperwood is a community-based ecology institute trusted to bring scientific expertise and resilience resources to our region to co-create place-based climate and fire adaptation strategies. Our Fire Recovery and Response program summary specifically references our role serving our North Bay community and our Five-Year Strategic Plan references our Northern California and Sonoma County impact (see attachment) .

Founded originally as a supporting organization of Community Foundation Sonoma County, we are a trusted partner for convening and coordinating collaborations, educational workshops, and other kinds of public events at our 3,200-acre nature preserve and the 9,800-square foot Dwight Center for Conservation Science on-site. We serve everyone in our community, including elementary schools, private landowners, social service organizations, and local government agencies by bringing the community together to craft resilience solutions. Pepperwood has cultivated long-standing partnerships with other local nonprofit organizations, schools, tribes, government agencies, private landowners, and local residents through a variety of initiatives and partnerships. Examples of our community service role in the North Bay and Sonoma County :

1) **Empowering our LatinX Community Through STEM Education**. Pepperwood offers fully bi-lingual programs for North Bay youth and teens, cosponsors an annual LatinX Climate Leadership Summit, and partners with several federally recognized Hispanic-serving organizations.
2) **Partnering with Local Fire Safe Councils and Other Neighborhood Disaster Preparedness Groups.** Pepperwood collaborates with organizations such as Fire Safe Sonoma to create fire hazard data and reduction recommendations, and leads fire hazard reduction workshops for local residents and groups.
3) **Elevating Local Indigenous Leaders.** Pepperwood hosts an active Native Advisory Council comprised of local tribe elders to elevate indigenous leadership in all of our program areas and collaborations.
4) **Co-Creating Community-Based Climate and Fire Adaptation Plans.** Pepperwood has engaged partners (including Sonoma State University and UC Berkeley) to create site-specific climate action plans, and generated plans for tribes, watershed groups, districts, and more.
5) **Cooperative Approaches to Building Social Service Organization Capacity, Including Peer-to-Peer Learning.** Pepperwood is engaged in the Resilient Leadership collaborative, helping social service organizations improve their wildfire and disaster resilience through a collaborative NGO ecosystem.

Section 3 – Environmental Justice and Underserved Communities

The impact of wildfire on Sonoma County and the North Bay have rendered us "frontline communities" in the climate crisis. What we have learned in Sonoma County is that disasters amplify equity gaps. We know the impacts of wildfire are disproportionately impacting our vulnerable communities, in terms of both direct impacts (loss of life and property) and indirect impacts like smoke. Our target populations were chosen due to the lack of infrastructure to address their unique needs. Seniors are predisposed to pre-existing and chronic health conditions, including asthma, that are exacerbated by smoke. Although exposure to smoke is a known health concern, farmworkers are known to continue to be directed to work in fields filled with smoke–even within evacuation areas–in order to recover crops before they are damaged by smoke and to continue to earn money that would be lost if they chose not to work. Spanish-speaking members of the community are further disadvantaged when emergency response announcements are not made available to them in their primary language.

Our lead EJ partner is North Bay Jobs with Justice, a grassroots coalition that represents communities of color, low-income workers, immigrant families, LGBTQ+, and youth to provide safe communities and working conditions. With outdoor workers facing the worst of the health impacts, NBJwJ has developed a leadership capacity-building program to "train the trainers" and develop a cadre of "Equipos" who serve outdoor workers by going to the fields to explain their options for reducing hazards and to distribute protective equipment. NBJwJ is also working on the policy front for stronger worker protections during and in the wake of fires. Alma Bowen, the LatinX founder of Nuestra Comunidad, was working as a dispatcher in the fire of 2017 when she realized she was the only source of Spanish-language guidance for her community. Leaving to found Nuestra Comunidad, she now serves vulnerable populations, consulting to public agencies, and training youth to be emergency preparedness advocates. Priscilla Ambercrombie, founder of COPE, a retired nurse practitioner in the Geyserville area, was uniquely qualified to provide free outreach and air purifiers to isolated seniors to empower them to understand their health risks and take action to stay safe.

Key to meeting this challenge is meeting people where they are and providing information in comfortable formats, and realizing that standard science and technical communications can be alienating to EJ communities is one of the barriers we need to overcome. That's what the goal of this project is to put science into the hands of EJ communities and the leaders that serve them. To address this need, this team will design and organize bi-lingual English/Spanish focus groups targeted to each of our target populations (primarily LatinX and seniors) and hosted at places in the community where these populations already go. To motivate engagement, participating community members will receive incentives (potentially gift cards) to share their knowledge of air quality issues and the time of emergency preparedness support that would be meaningful and useful for them. In turn, partners will review the feedback gleaned from these focus groups to develop a pilot air quality engagement proposal. In providing measuring tools for seniors who spend much of their time indoors and for farmworkers who spend much of their time in remote locations that are not served by many air quality measuring devices, we can fill data gaps that enhance existing public health efforts.

Section 4 – Environmental Results—Outcomes, Outputs and Performance Measures

The outcomes of this project include filling critical air quality data gaps, increasing community awareness, motivating community action to mitigate particulate air pollution effects, and reducing human exposure to particulate air pollution for engaged populations. Outputs of this project include deployment of a new AQ sensor network to conduct air quality measurements in underserved communities in Northern Sonoma County. This will provide new data to augment local air quality information where it is very sparse. At-risk communities will have access to bi-lingual platforms and educational experiences based on near real-time air quality data. We will elevate the leadership of EJ pioneers in our community and empower them with the best science possible to address inequities in environmental hazards during the wildfire season. This project supports EPA's Draft Fiscal Year (FY) 2022-2026 Strategic Plan, Goal 4 - Objective 4.1: "Improve Air Quality and Reduce Localized Pollution and Health Impacts" including the resulting outcomes and outputs (Table 1).

A. Expected Project Outputs and Outcomes (Table 1)

	Outcome/Output	Description
Air Quality	Community mid-range AQ network deployed in the Northern Sonoma County	3 remote locations & 17 locations within the community living and working environments, adding 20 sites to current AQ measuring capabilities
	Continuous PM2.5 concentration data	Data availability - every 5 min at 20 locations uploaded to the Clarity OpenMap Public Platform
	PM2.5 and AQI maps of the region	Accessible through the local Clarity dashboard, and other potential platforms
	Community AQ dashboard	Clarity dashboard adapted to the community needs
	Early detection smoke alert system on the community dashboard	Wildfire/prescribed fire events
	Increased community awareness	Short term
	Community action to mitigate particulate air pollution	Intermediate term
	Reduction of human exposure to particulate air pollution; Leverage efforts for air quality modeling validation	Long term goal aided by the completion of this project
Community Engagement	Model Community Engagement Plan	This plan will inform identification of key threats, inform priority locations, and identify positive outcomes for target communities
	Bi-lingual air quality response training curricula	These trainings will be used to empower residents to activate air quality sensors and relay collected data to our dashboard.
	Project documentation and publications	Disseminated via various outlets
	Increased access to air quality tools	Long term goal aided by the completion of this project

B. Performance Measures and Plan

In order to assess progress for project completion, Pepperwood will maintain a detailed work plan and calendar with task assignments that are reviewed on a regular basis throughout the project timeline. Pepperwood will assign a Program Manager (PM) that will be responsible for tracking tasks, progress, and coordinating the communication between the large number of partners in this proposed project. The PM will oversee subrecipients, partners, and vendors on a bi-weekly basis, by tracking and reporting project progress on tasks and purchases; including tracking, measuring, and reporting accomplishments and proposed timelines and milestones (Table 2 below). The AQ network performance will be measured through the QA/QC plan as detailed in section 5 and deliverables will be tracked and reported as well. Regularly scheduled meetings with our Community Engagement Working Group and TAC will allow us to maintain a regular check-in with partners that includes reports on the status of project milestones and opportunities to make adjustments to our workplan should unexpected events arise. The success of this project will be evaluated by team partners at our final group meetings via formal and informal methods including a structured survey. Factors to include: ability to complete the tasks established by our workplan and our ability to make meaningful impact on our target populations as defined by the community leaders in our Community Engagement Working Group.

C. Timeline and Milestones (Table 2)

TASK	DESCRIPTION	TASK OWNER	2022	2023				2024				2025			
			Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1. Project Management															
1a	Finalize Contracts & Detailed Workplan	PWD		M1											
1b	Project Kick-off	PWD													
1c	Standing Project Management Mtgs	PWD													
1d	Invoicing & Interim Reports	PWD													
1e	Project Closure: Reporting	PWD													M11
2. Techincal Advisory Committee Engagement															
2a	Finalize Participants & Work Plan	USRA		M2											
2b	TAC Meetings (6 total)	USRA													
3. Community Engagement															
3a	Finalize Participants & Engagement Pln	PWD/SLNA		M2											
3b	Host CEWG Meetings	CEWG													
3c	Host Community Focus Groups	CEWG			M3				M3						
3d	Conduct Community Survey	CEWG				M5									
3e	Community Leadership Capacity-Bdg	NBJJ												M8	
3f	Finalize Outreach Package w Comm Mbrs	NC/COPE													M9
4. Air Quality Technical Work															
4a	Technical Project Management	USRA													
4b	Sensor Network Design & Installation	USRA			M4										
4c	Data Analysis, Management, and Dashboard Integration	USRA					M6				M7				
4d	Publications & Dissemination	USRA/PWD													M10

ACRONYMS

CEWG	Community Engagement Working Group
COPE	Citizens Organized to Prepare for Emergencies (COPE)
NBJJ	North Bay Jobs with Justice
NC	Nuestra Comunidad
PWD	Pepperwood
SLNA	Soluna Outreach Solutions
TAC	Technical Advisory Committee
USRA	Universities Space Research Association

MILESTONES

M1	Finalize contracts & detailed workplan
M2	Finalize TAC, CEWG members and engagement plan
M3	Focus groups conducted
M4	AQ sensor network deployed; data properly streaming
M5	Community survey completed
M6	Dashboard ready for community training
M6	Data analysis, management, dashboard integrated
M7	Complete dashboard integration
M8	Community leadership capacity-building complete
M9	Finalize outreach package with community members
M10	Complete publications and begin dissemination
M11	Project closure and reporting

Section 5 – Quality Assurance Statement (please see attachment)

Section 6 – Programmatic Capability and Past Performance

A. Past Performance

Pepperwood has extensive experience receiving and completing assistance agreements from both federal and non-federal programs. As an organization that actively maintains a variety of grant awards for diverse

initiatives and collaborations, we are committed to retaining accurate records and schedules. Pepperwood's program managers are responsible for program implementation and reporting while our finance staff maintain bookkeeping records. All staff responsible for administering grants meet monthly to review current tasks. In the past three years, some of the grant awards that we received and administered include:

1. In 2019, we received a California Department of Fish & Wildlife grant of $838,000 to study "Post-Fire Restoration of Coast Range Headwaters for Multiple Benefits at Pepperwood Preserve."
2. In 2020, we received a CAL FIRE Forest Health Research grant of $210,000 to study, "Vegetation Trends and Cycles in the Fire-Prone Landscapes of Lake, Napa, and Sonoma Counties."
3. Between 2019 and 2020, we received three grants from Environmental Quality Incentives Program (EQIP) NRCS, USDA totaling $195,000.

B. Reporting Requirements

Both the CDFW and CAL FIRE grant projects are ongoing and we have effectively administered reporting on both projects, including programs that include collaborations with partners. The EQIP program provided us with three grants over two years, indicating that our ability to complete reporting requirements satisfied funder needs.

C. Staff Expertise

Pepperwood's staff includes a team of science and education experts with extensive experience engaging in multi-stakeholder initiatives and community partnerships. A Phi Beta Kappa scholar and 2020 Global Fulbright Fellow, Pepperwood's President and CEO, **Dr. Elisabeth Micheli** is a leader in large landscape conservation and specializes in facilitating interdisciplinary collaborations focused on using relevant research to craft collective solutions to today's most pressing landscape conservation challenges. Having worked at EPA's Office of Federal Activities, Micheli routinely had to integrate Clean Air Act compliance regulations into projects. **Kai Foster, MA**, Climate and Fire Resilience Coordinator, is a Project Manager and Senior GIS Specialist with more than a decade of experience working with diverse stakeholder groups to co-produce high quality science information with experience working with climate and wildfire recovery. Pepperwood's Finance and Operations Manager, **Jim Elias**, is a dedicated, mission-driven leader and has designed and spearheaded multiple land trust initiatives that permanently protected over 60,000 acres of natural, recreational, and agricultural landscapes in the Sierra, Rocky Mountains, and Intermountain West and will use this knowledge of complex data management to support administration of this grant. Pepperwood staff have access to our on-site Dwight CenterDwight Center for Conservation Science, 9,400 square-foot LEED-certified green building with work spaces, laboratory space, and classrooms. Pepperwood's computer network is operated via a centralized server unit. The organization is overseen by a 13-person Board of Directors.

Section 7 – Budget

Given Pepperwood's history of successfully administering large and small grants from both federal and non-federal sources, we will be able to meet grant administration requirements for this proposal. To ensure that we are maintaining progress toward project goals, Pepperwood's finance manager will conduct a budget review prior to team meetings with our TAC lead and our Community Engagement Working Group lead. When making purchases, we conduct a cost-benefit analysis when we make equipment purchases to ensure that we get the best rates available for our needs and will follow EPA guidance regarding competitive bidding should the need arise. Finally, we rely on a variety of funding sources, including other government grants, grants from private foundations, and individual donations to ensure financial stability within our organization. However, this program is budgeted to be entirely funded by this award program, if funded. See the Budget Table below.

Budget Detail Table (Table 3)	EPA Funding*
Personnel (Project Role (Title), hours are approximate)	
(1) Project Manager (President & CEO) @ $92/hr x 1.4 hrs/wk x 156 wks (3.5% of time)	$20,240
(1) Project Analyst/Climate & Fire Resilience Coordinator @ $43/hr x 6.2 hrs/wk x 156 wks (15.6% of time)	$41,710
(1) Accounting Specialist @ $43/hr x .75 hrs/wk x 156 wks (1.8% of time)	$4,945
(1) Fire Scientist/Technician @ $36/hr x 1.6 hrs/wk x 52 wks (4.1% of time)	$3,060
(1) Communications Coordinator @ $29/hr x .3 hrs/wk x 156 wks (0.08% of time)	$1,392
TOTAL PERSONNEL	**$71,347**
Fringe Benefits (Retirement, Health Benefits, FICA, SUI, variable by employee)**	
(1) Project Manager - President & CEO @ 220 hrs x $22/hr	$4,840
(1) Climate & Fire Resilience Coordinator @ 970 hrs x $7/hr	$6,790
(1) Accounting Specialist @ 115 hr x $10/hr	$1,150
(1) Fire Scientist/Technician @ 85 hrs x $10/hr	$850
(1) Communications Coordinator @ 48 hrs x $9/hr	$432
Salary and Wages @ Individually Determined Rates - Retirement, Health Benefits, FICA, SUI	$14,062
TOTAL FRINGE BENEFITS	**$14,062**
Travel	
Mileage for 750 miles: 4.8 miles/wk @ $.585/mi x 156 wks	$439
TOTAL TRAVEL	**$439**
Supplies	
Air Quality Sensors (two types from two vendors)	$57,000
Laptop Computer	$1,500
TOTAL SUPPLIES	**$58,500**
Other - Partner Subawards & Honoraria	
USRA	$234,944
Soluna Outreach Solutions	$60,660
COPE-TAC and Smoke Ready	$4,000
Nuestra Comunidad	$4,000
North Bay Jobs with Justice	$6,000
TOTAL OTHER	**$ 309,604**
Indirect Charges	
Indirect at 10% x $453,952 (personnel + fringe + travel + supplies + other)	$45,395
TOTAL INDIRECT	**$45,395**
TOTAL FUNDING	**$ 499,347**
TOTAL PROJECT COST	**$ 499,347**

* All funding from this program will be Federal as proposed above.

** **Fringe Benefits** include the cost of leave, employee insurance (including medical insurance), retirement plans and unemployment benefit plans. Employee fringe benefit rates vary depending on individual circumstances, including medical insurance rates, whether employees elect to participate in individual retirement plans, vacation accrual, and other employee-specific circumstances. For the project as a whole, fringe benefits are 19.7% of personnel salaries, and 16.5% of total personnel expenses.

Pepperwood Preserve

Elisabeth (Lisa) Micheli, PhD

Curriculum Vitae

AREAS OF RESEARCH

integrated hydrology-climate-fire-biology monitoring and modeling for fire resilience
eco-hydrology and geomorphology of streams
and watersheds and large landscape conservation

CONTACT

President, Dwight Center for Conservation Science
2130 Pepperwood Preserve Road, Santa Rosa, CA 95404
Ex. 6 Personal Privacy (PP)

PROFESSIONAL PREPARATION

Institution and Location	Degree	Year	Field of Study
Harvard College, Cambridge, MA	AB	1987	*History & Science*
King's College, Cambridge University	MPhil	1989	*History & Philosophy of Science*
University of California, Berkeley, CA	MS	1996	*Civil Engineering*
University of California, Berkeley, CA	PhD	2000	*Energy & Resources*
University of California, Davis, CA	PostDoc	2001	*Geology*

APPOINTMENTS

President, Dwight Center for Conservation Science at Pepperwood, *2009 to present*
Responsible for team structure, program development, funding, collaborative research design and oversight for a private field station sited on a 3,200-acre nature preserve run in partnership with the California Academy of Sciences. Currently co-chair of the Terrestrial Biodiversity Climate Change Collaborative (TBC3), a multi-agency effort in partnership with University of California that co-creates climate change projections, fire probability models, resilience strategies, and long-term resource monitoring with Northern Californian land and water managers.

Co-Principal Investigator, California Academy of Sciences, *2007 to 2009*
Program Manager, Sonoma Ecology Center, *2002 to 2009*
Associate Researcher, Department of Geology, UC Davis, *2000 to 2002*
Graduate Researcher and Teaching Assistant, UC Berkeley, *1995 to 2000*
Environmental Scientist, US Environmental Protection Agency, Region 9, *1989 to 1995*

SELECTED PUBLICATIONS

1. Gray, M., **Micheli, L.,** Comendant, T., and Merenlender, A. 2020. Quantifying Climate-Wise Connectivity across a Topographically Diverse Landscape. *Land* 9. 355. 10.3390/land9100355.
2. Gray, M., **Micheli, L.,** Comendant, T., and Merenlender, A. 2020. Climate-Wise Habitat Connectivity Takes Sustained Stakeholder Engagement. *Land* 9. 413. 10.3390/land9110413.
3. Halbur, M., Comendant, T., Gillogly, M., Friedfel, D., Ferrell, R., Hammerich, S., and **Micheli, L.** 2020. Pepperwood's Forest Monitoring Plan. A Dwight Center for Conservation Science at Pepperwood (Santa Rosa, CA,) Technical report prepared for California Department of Fish and Wildlife, pp. 69.
4. Comendant, T. Ferrell, R., Halbur, M., Gray, M. Hammerich, S. and **Micheli, L.** 2019. Pepperwood's Climate-Ecosystem Sentinel Site Plan 2020-2025. A Dwight Center for Conservation Science at Pepperwood (Santa Rosa, CA) technical report prepared for National Science Foundation, pp. 71.
5. **Micheli, E.,** Dodge, C., Flint, L., and Comendant, T. 2018. *Climate and Natural Resource Analyses and Planning for the North Coast Resource Partnership: a technical memorandum summarizing data products*. A final report prepared under the auspices of the California Strategic Growth Council by

Publications, cont'd

the Dwight Center for Conservation Science at Pepperwood, Santa Rosa, CA, for West Coast Watershed and the North Coast Resource Partnership.

6. **Micheli, E.**, Flint, L., Veloz, S., Johnson (Higgason), K., and Heller, N. 2016. Climate Ready North Bay: Project and Regional Summary. A technical memorandum prepared by the Dwight Center for Conservation Science at Pepperwood, Santa Rosa, CA, for the California Coastal Conservancy and Regional Climate Protection Authority.
7. Heller, N., Kreitler, J., Ackerly, D. D., Weiss, S. B., Recinos, A., Branciforte, R., Flint, L. E., Flint, A. L., and **Micheli, E.** 2015. Targeting climate diversity in conservation planning to build resilience to climate change. *Ecosphere* **6**:65.
8. Chornesky, E., Ackerly, D., Beier, P., Davis, F., Flint, L., Lawler, J., Moyle, P., Moritz, M., Scoovner, M., Byrd, K., Alvarez, P., Heller, N., **Micheli E.,** and Weiss, S. 2015. Adapting California's ecosystems to a changing climate. *BioScience* **65**:247–262.
9. **Micheli, L.**, and Ackerly, D. 2013. The Terrestrial Biodiversity Climate Change Collaborative (TBC3): An interdisciplinary strategy for advancing science-based conservation. Dwight Center for Conservation Science at Pepperwood, Santa Rosa, CA.
10. **Micheli, E.**, Flint, L., Flint, A., Kennedy, M., and Weiss, S. 2012. Downscaling future climates to the watershed scale. *San Francisco Estuary and Watershed Science* **12**:1-31.
11. Flint, L., Flint, A., Weiss, S., and **Micheli, E**. 2010. Hope for the Forest? Habitat resiliency illustrated in the face of climate change using fine-scale modeling. *Eos*, American Geophysical Union 2010 Annual Meeting Abstracts.
12. **Micheli, E.**, Kirchner, J., and Larsen, E. 2004. Quantifying the effect of riparian forest versus agricultural vegetation on river meander migration rates, Central Sacramento River, California, USA. *River Research and Applications* **20**:537-548.
13. **Micheli, E.**, and Larsen, E. 2011. River channel cutoff dynamics, Sacramento River, California, USA. River Research and Applications **27**:328-344.

SYNERGISTIC ACTIVITIES

My work is focused on facilitating multi-disciplinary applied science assessments designed to increase the climate and fire resilience of the lands, waters, and communities of the California Coast Ranges. I work for a non-governmental organization that leads collaborative research uniting university, government, community college, and citizen scientists. We work with local agencies and communities to apply regional applications of downscaled environmental data and fire projections to develop model resilience solutions for Mediterranean-type landscapes. With promote the long-term monitoring of our climate, water cycle, fire ecology and biological responses in plant and animal populations via the "Sentinel Site" sensor array on Pepperwood's 3,200-acre field station. Since 2010, I have served as co-chair with Dr. David Ackerly of UC Berkeley of the Terrestrial Biodiversity Climate Change Collaborative (TBC3). In the wake of recent catastrophic wildfire impacting our region, I help facilitate cross-sector efforts such as the MapOne Sonoma climate resilience project sponsored by Community Foundation Sonoma County. I am a Director of the Rebuild NorthBay Foundation, where I co-chair the Environment and Sustainability Advisory Committee and serve as science advisor to numerous municipal public safety, planning, and land and water management agencies, including Sonoma County's Integrated Hazard Mitigation Plan and Community Wildfire Protection Plan efforts. I am also a founding member of the steering committee for a new California Biodiversity Network serving the California Natural Resources Agency.

AWARDS

Phi Beta Kappa (1987), NASA Earth Systems Research Fellow (1996-2000), Switzer California Environmental Leader (2008), North Bay Business Journal Green Business Leader (2011), California Academy of Sciences Fellow (2017), Bay Nature Local Hero (2018), Fulbright Global Scholar (2020).

MEYTAR SOREK-HAMER, PHD | linkedin.com/in/meytar-sorekhamer

MANAGER - RESEARCH SCIENTIST - ENGINEER

15 years of experience managing air quality, environmental and data science-oriented multidisciplinary projects across research and industry roles. Natural leader who brings excellent communication skills, emphasis on national and international collaborative environments, and direct hands-on experience in planning and executing projects. Innovator who thinks out of the box to solve problems and is passionate about turning theoretical concepts into application to solve real-word, large-scale problems that will have an impact on humanity and the environment, and transferring this knowledge to the next generation.

EXPERTISE

- R, QGIS
- Statistical Modeling
- Big data
- Leading ML Teams
- Collaborations
- Air quality
- Scientific Writing
- Project Management
- Presenting

SELECT QUALIFICATIONS

- **Air quality and remote sensing professional** with 10+ years of experience in developing air quality models, obtaining and analyzing satellite data and ground monitoring data, mapping, using multiple data sources, including: NASA and commercial satellite data and images, ground monitoring networks, and meteorology, for environmental health applications, e.g. Sorek-Hamer et al. (2016) 'The use of satellite remote sensing in epidemiological studies', Current opinion in pediatrics 28 (2), 228.
- **Build collaborative networks** with academia (Harvard, UBC, USC, Mt. Sinai, etc.), governmental (NASA JPL, GSFC, USGS, etc.), and private organizations (BAAQMD, MAXAR, STI), resulting in over $1.5M awarded proposals, scientific papers, and conference presentations.
- **Project Manager** leading multidisciplinary projects from planning, budget development, through executing, problem solving and delivering. Strong coordinating skills collaborating with cross-functional teams worldwide. Currently PM on several Earth science projects and completed the development of a Shiny R website for the ISS aerosol experiment data analysis as a basis for a multidisciplinary consortium to develop an air quality index for space missions (https://iss-particle-db.arc.nasa.gov/).
- **Team leader** in data analysis and modeling for air quality and environmental applications. Currently leading the Environmental Analytics group (8 PhD researchers, 2 interns) and an air and noise pollution ML modeling team of 4 researchers and 2 interns, as part of an international collaboration with UBC and Imperial College - "Pathways to equitable healthy cities".
- **Presenter** in conferences and invited talks at Imperial College, London (2020) on applying deep learning for estimating air quality in urban environments which resulted in a paper, submitted to ERL; and at Basel (2018) and the Exposome Conference, NYC (2020) on the use of satellite data for environmental applications.

PROFESSIONAL EXPERIENCE

Manager and Research Scientist, USRA at NASA AMES Research Center, CA 2018–current
Head of the Environmental Analytics group, leading groundbreaking research in the realm of applying advanced Machine learning approaches to Environmental applications on Earth and in Space.

Post-Doctoral Fellow, NASA Ames Research Center – CA 2016–2018
Lead investigator: Analysing the contribution of AOD to PM estimation models using various statistical tools, applying ML methods for understanding local characteristics of the AOD-PM relationship. Leading proposal teams.

Post-Doctoral Fellow, Ben Gurion University – Israel 2015–2016
Lead Remote Sensing Researcher: Improving satellite-based models for estimating AQ over Israel using high resolution satellite products.

Head of Environmental Engineering Department, TAHAL Ltd. – Israel 2006–2009
Overall responsibility for all environmental aspects of company projects. Rendering of environmental consulting services, including preparation of expert opinions, assimilation of subjects relating to environmental protection in companies, writing environmental procedures, preparation of environmental reports and documents. Coordination with external agencies such as private and government companies, green entities, and the Israel Ministry of Environmental Protection.

Environmental Engineer and Project Manager, Asiff Strategies Ltd. – Israel 2004–2006
Environmental consulting services, including preparation of expert opinions. Trading of GHG through the company's subsidiary (Elysium – Carbon Trading and Investments Ltd) in collaboration with the United Nations.

PUBLICATIONS

Published 20+ papers and book chapters across multiple scientific journals and conference proceedings: 2013–present
https://scholar.google.com/citations?hl=en&user=AVdfPH0AAAAJ&view_op=list_works&sortby=pubda

EDUCATION

PhD Environmental Engineering (Direct Track) – Technion, Israel Institute of Technology 2015
Environmental Engineering (*summa cum laude)* – Technion, Israel Institute of Technology 2004

PROFESSIONAL COURSES

AI for Leadership – MIT, Sloan school of Business 2021

AWARDS AND FELLOWSHIPS

2021	USRA IRAD Award
2020	NEURIPS best lightening talk recognition
2020	USRA Leadership recognition
2019	USRA IRAD Award
2019	NASA ARIA Award
2016-2018	NASA Postdoctoral fellowship (NPP program administered by USRA)
2012-2014	EHF doctoral fellowship. Including Summer Internship (2012) at NASA AMES Research Center, CA, USA
2010-2013	Ministry of science & technology scholarship
2009-2012	Vatat scholarship – Israel Council for Higher Education
2011	First prize award for best presentation, The Israel Society for Ecology and Environmental Quality Sciences 39rd Annual Conference, Israel.
2010	Faculty excellence award2021

Membership and Reviewer activities

2022- IES full member (Institution of Environmental Sciences)
2022- Sigma Xi Fellow
2021- ISEE (International Society of Environmental Epidemiology)
2019- AAAR (American Association of Aerosol Research)
2017 AWMA (Air & Waste management Association)
2017- HAQAST (Health & Air Quality Science Team)
2016- AGU (American Geophysical Union)

Reviewer for JGR, Nature Medicine, Remote Sensing, Remote Sensing of the Environment, Atmospheric Environment, Atmosphere.

ADDITIONAL DATA

Founder and Manager, "ACHVA – Students Volunteering in The Community" – Israel 2001–2004
An organization in the Technion Institute. Received an excellence award from the Haifa Municipality in 2004.
Thru-hiker, Pacific Crest Trail (PCT) 2000

SOLUNA
Outreach Solutions

A Door to Community Engagement

RESUME
Hugo Mata

EXPERIENCE

HHMG LLC — Santa Rosa, California
COO — *Present*

Oversee daily operations for Red Latin-X Hub a physical space which provides resources such as conference rooms for meetings, short-term office space, guidance in business practices, voting information, environmental programs, referrals to health services, and much more. Producer and host for Poder de Saber, Latin-X Radio and other programs that provide services to the LatinX communities and LatinX-serving companies in Sonoma County.

Soluna Outreach Solutions — Santa Rosa, California
Principal/CEO — *2017-Present*

Conduct innovative environmental education and outreach programs for diverse audiences on behalf of local governments. This include management of contracts and client relations; development of new programs & materials; publicity and media relations on behalf of clients; management of employees and all aspects of company operations; hands-on work conducting educational outreach.

C^2 Alternative Services — Santa Rosa, California
Outreach Worker — *2001-2006*
Bilingual Outreach Specialist — *2006- 2009*
Director for Media and Bilingual Outreach — *2009-2017*

- Outreach to English and Spanish speaking communities in several counties to promote environmental awareness including waste reduction, recycling, water conservation, household hazardous waste and pollution prevention.
- Multicultural Outreach research and planning: strategies for reaching diverse immigrant audiences.
- English as Second Language programs: work with ESL programs and teachers using special lessons on environmental topics in 20+ counties.
- Media relations: includes research and negotiating media buys as well as on-air interviews and writing radio spots and PSAs.
- Workshops and Training Development: for Latino audiences including *Promotores Verdes* Groups, public and workplace events, and HAZWOPER training.
- Translations/interpretations for government agencies ranging from brief radio spots to full recycling guides.
- Presentations at various, local State and Regional Conferences including Northern California Recycling Association (NCRA), North American Hazardous Materials Management Association (NAHMMA) and The Department of Resources Recycling and Recovery (CalRecycle) Recycle Used Oil/HHW; as well as Vision y Compromiso and Las Vegas Waste Expo.

Bay Area Translations, Inc./Language People Inc. — Santa Rosa, California
Freelance Translator/Interpreter — *2003-Present*

- Translating: legal, corporate, employment materials, training manuals, medical and financial records

Soluna Outreach Solutions
hugo@solunaoutreachsolutions.com
www.solunaoutreachsolutions.com
PO Box 14625, Santa Rosa, CA. 95404
Phone: 707/494-1699

- Interpretation for corporations, wineries, hospitals and medical facilities, schools, and legal offices
- Voiceover work for training and education videos in English and Spanish

KBBF Bilingual Radio Santa Rosa, California
Positions
Host / Producer *2000 – Present*
Operations Manager / Producer / Host / Trainer/Public Relations *2000 – 2003*
Development Director / Grant Writer / Host *1998 - 2000*

- Oversaw daily operations for the radio station managing a team of five full-time staff and over 120 volunteers
- Lead a public relations team covering an eight-county area
- Sales and grant writing ending in an increase in revenue
- Current host and producer for *Nuestra Tierra/*Our Earth, a weekly environmental show, with interviews and commentary
- Produced and hosted, *La Onda Juvenil*, a two-hour youth oriented daily show; and *Diversión Cultural*, a three-hour bilingual show
- Trained and motivated new volunteers to work for public radio during eight-week training sessions

The Big Picture Productions San Rafael, California
Intern *2005 - 2006*

- Production Assistant for projects ranging from public service announcements to interviews and news

San Francisco State University San Francisco, California
Technical Director & Set Crew *March 2006*

- Professional symposium "Changing Channels: A Conversation on the Future of Media," at San Francisco State University. Multi-cam live to tape studio shoot

EDUCATION

LRP Rohnert Park Cohort Rohnert Park, California
8 full-day experiences and a collaborative group project to address a local challenge *2019-May 2020*

Leadership Institute for Ecology and the Economy Santa Rosa, California
Leadership for a Sustainable Future Program *September 2013-June 2014*

San Francisco State University San Francisco, California
Bachelor of Arts Major: Radio and Television *May 2006*

AWARDS

- 2020 North Bay Business Journal, Latino Business Leadership Award
- 2003 / 2001 Los Años Dorados Contribution Award
- 2002 Certificate of Recognition from California Assembly, and the State Senate- Media Involvement
- 2002 Redwood Award for Media Involvement in drug in alcohol prevention

Soluna Outreach Solutions
hugo@solunaoutreachsolutions.com PO Box 14625, Santa Rosa, CA. 95404
www.solunaoutreachsolutions.com Phone: 707/494-1699

Kai Foster, M.A.

Project Manager and Senior GIS Specialist with more than a decade of experience working with diverse stakeholder groups to co-produce high quality science information that is accessible to a wide range of people, both technical and non-technical. Proven ability to perform effectively in project coordination, internal communication, public outreach, and analytical research both independently and as part of a team. Professional expertise in developing, managing and integrating scientific information and data to inform decision making about wildfire and climate change challenges. Skills and experience include:

- Building stakeholder relationships, impactful partnerships, and collaborative teams
- Analyzing, interpreting and organizing scientific research results
- Facilitating internal and external team meetings, workshops, and training
- Managing project tasks, budgets and annual reporting
- Organizing and maintaining spatial data and information
- Creation and delivery of professional presentations and publications

EDUCATION

M.A. Applied Anthropology, Oregon State University, Corvallis, OR. 2007.
Thesis: "Toxic Politics at 64N, 171W: Addressing Military Contaminants on St. Lawrence Island, Alaska."

Graduate Certificate (GISci), Oregon State University, Corvallis, OR. 2007.

B.A. Anthropology, Sonoma State University, Rohnert Park, CA.2001.

EMPLOYMENT HISTORY

2017 - present. Part-time Instructor, *Oregon State University Graduate School*, Corvallis, OR

2008 - present. Project Manager/Senior GIS Specialist, *Conservation Biology Institute*, Corvallis, OR

2006 - 2007. Research Assistant, *Oregon State University Department of Anthropology*, Corvallis, OR

2006. Assistant to Science Curator, *Te Manawa Museum*, Palmerston North, New Zealand

2005. Field Researcher, *Alaska Community Action on Toxics*, Anchorage, AK

SELECT PROJECT EXPERIENCE

Social Analysis Lead – Santa Monica Mountains Woolsey Fire Recovery and Adaptation Program

Lead GIS Analyst – Protecting Communities from Wildfire with Progressive Land Use Planning

Project Manager – Northern California Climate Adaptation Project

Project Manager – Natural Vegetation and Protected Lands Mechanisms

Project Manager – Micronesia Challenge Terrestrial Measures Initiative Viewer (mcterrestrialmeasures.org)

Project Manager – Landscape Climate Dashboard (climatedashboard.org/)

Outreach, Training and Content Development Specialist – Data Basin (www.databasin.org)

CONFERENCES

2017 - Ecological Society of America conference presentation, "Exploring global environmental change issues: Using an online spatial data sharing platform in the classroom"

2015 – George Wright conference presentation, "Conservation Easements and their Contribution to Natural Vegetation Protection"

2014 – Ecological Society of America conference presentation, "Strengthening the foundation of conservation: Building the Protected Areas Database, the LCC conservation atlases and delivering CSC climate change projections"

2014 – Ecological Society of America conference facilitation of Data Basin workshop

APPOINTMENTS AND AWARDS

2019 – Courtesy Faculty – Oregon State University Graduate College

2019 – Affiliated Staff – Oregon State University College of Earth, Ocean, and Atmospheric Sciences

2009/16 - Steering Committee Member - National Conservation Easement Database (NCED)

2005 - Graduate Student Academic Achievement Award, Oregon State University Department of Anthropology

Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions

Community Set-Aside Justification

Wildfire impacts on the North Bay have rendered us a "frontline community" in the climate crisis. Pepperwood brings scientists and communities together to confront environmental challenges that require teamwork, innovative solutions, and a passion to protect our local communities and the life and landscapes they rely upon. The challenge of adapting to wildfire smoke during our now extended wildfire seasons is one of the more pernicious and widespread impacts of an otherwise highly localized kind of disaster.

Founded originally as a supporting organization of Community Foundation Sonoma County (CFSC), Pepperwood is a trusted partner for convening and coordinating collaborations, educational workshops, and other public events at our 3,200-acre nature preserve and the 9,800-square foot Dwight Center for Conservation Science. We serve throughout the North Bay and have cultivated long-standing partnerships with other local nonprofits, schools, tribes, government agencies, private landowners, and local residents through a variety of initiatives. Examples of our community service role in the North Bay and Sonoma County include:

Empowering our LatinX Community Through STEM Education. Pepperwood was the first environmental education provider to offer fully bi-lingual programs for local North Bay youth via Students Conducting Environmental Inquiry (SCENIQ), which engages 30 local elementary school classes in workshops in conjunction with field trips to our preserve. Our TeenNat Institute offers STEM career training for Sonoma County teens. We hold an MOU with Santa Rosa Junior College (for our Conservation Science Internship program) and Sonoma State University, both federally-recognized Hispanic-serving Institutions. We provide scholarships for Title I schools so under-resourced kids can experience an inquiry-based approach to science and nature. We also cosponsor an annual LatinX Climate Leadership Summit.

Partnering with Local Fire Safe Councils and Other Neighborhood Disaster Preparedness Groups. Pepperwood works in the field and on the ground with multiple local Fire Safe councils, including Fire Safe Sonoma, to provide high resolution, downscaled fire hazard data products and recommendations to inform neighborhood-scale Community Wildfire Protection Plans. We also host fire hazard reduction workshops on-site for local residents, which are consistently fully subscribed.

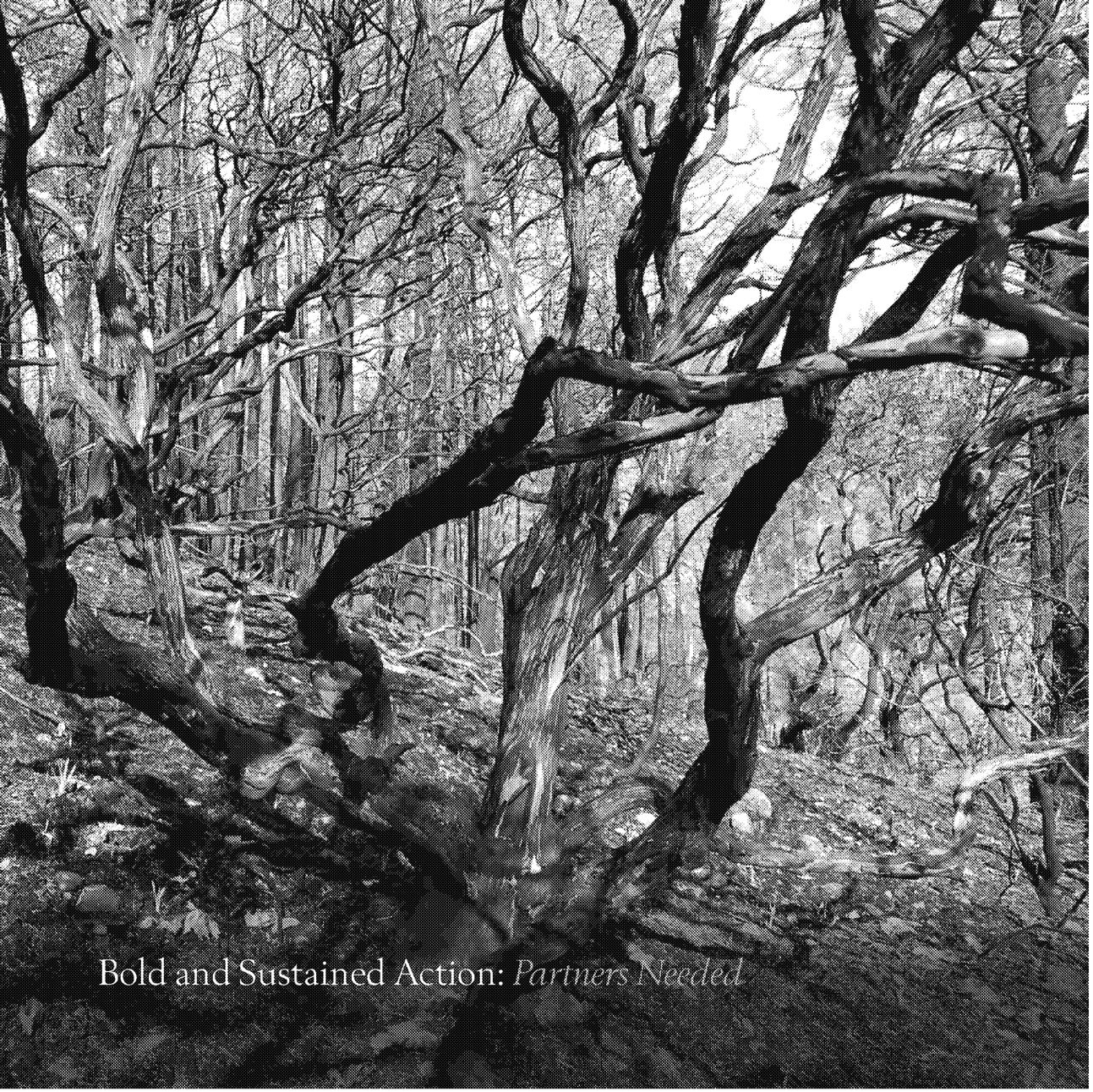
Elevating Local Indigenous Leaders. Pepperwood hosts an active Native Advisory Council (NAC) composed of local tribal leaders representing Wappo, Pomo, Wintun, Northern Sierra Miwok, Tongva, Ajachmem, Rarámuri, and Mishewal Wappo tribes. Pepperwood's NAC elevates Indigenous leadership across programs and lends expertise to support sister organizations and conservation social service.

Co-Creating Community-Based Climate and Fire Adaptation Plans. Pepperwood routinely engages our education partners in the development of site-specific climate action plans, including Climate Ready North Bay, providing the community their first localized climate and fire projections. We also generate plans for tribes, County districts and agencies, Greenbelt organizations, and land trusts.

Cooperative Approaches to Building Social Service Organization Capacity, Including Peer-to-Peer Learning. Pepperwood is a founding member of the Resilient Leadership Collaborative, a capacity-building effort launched by CFSC and the United Way of the Wine Country to boost organizations that span disaster preparedness, environment, elder housing, mental health, labor, and more. We are crafting an approach to disaster resilience by creating an ecosystem of mutually supportive NGOs that work collaboratively with leadership development and program delivery. Dr. Micheli serves on the Board of the community-to-community fire response learning network, After the Fire.

Attached is a copy of both our Five-Year Strategic Plan (see especially pages 4, 5, and 15) and our Fire Response and Recovery program summary.


Pepperwood
Science Solutions for Resilience
STRATEGIC PLAN 2020-2025

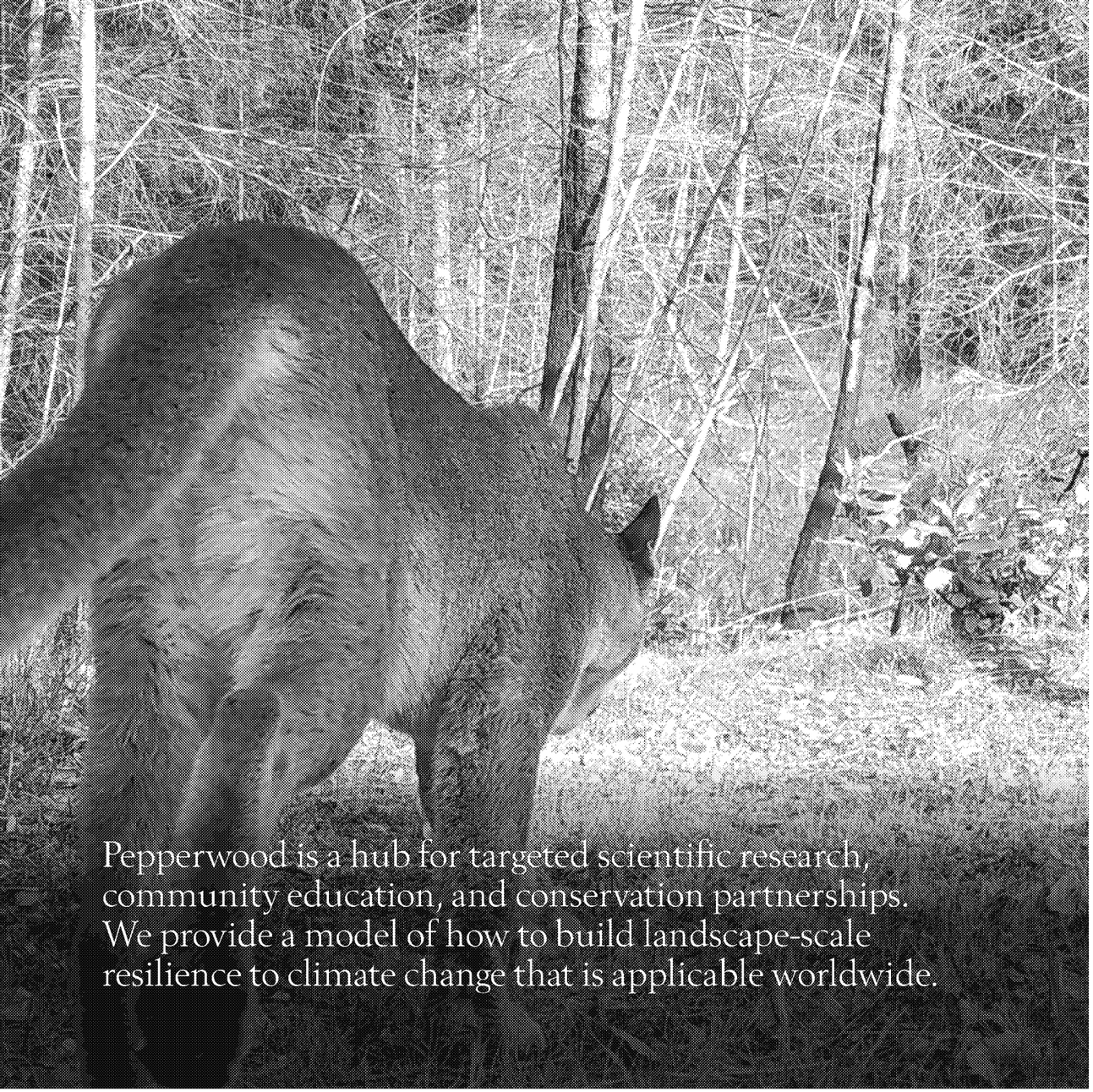


Bold and Sustained Action: *Partners Needed*

Pepperwood seeks partners who care about the health of our community and our land, water, and wildlife to join us in a shared mission to create a resilient planet. Our success will be contingent on securing critical financial and human resources from those who embrace the urgency of our current climate challenge. And it will require bold and sustained action.

Please join us in supporting Pepperwood's breakthrough five-year strategy to drive the science-based solutions needed to steward the natural assets we all rely on for our wellbeing.

Lisa Micheli, PhD, *President and CEO*



Pepperwood is a hub for targeted scientific research, community education, and conservation partnerships. We provide a model of how to build landscape-scale resilience to climate change that is applicable worldwide.

At Pepperwood, we connect tens of thousands of California residents annually to nature and nature-based climate solutions via programming conducted on our 3,200-acre reserve and beyond. Our calling is to bring scientists and community together to ensure that our cherished life and landscapes continue to thrive for generations to come.

We use our reserve as a living laboratory to:

- Engage researchers and decision-makers in measuring and mapping the processes driving ecosystem change
- Serve as a Sentinel Site for climate change through the application of cutting-edge environmental sensor technology
- Develop science-based solutions to reduce wildfire hazards, manage floods and droughts, promote regenerative agriculture, and prevent the extinction of our precious wildlife
- Mobilize a network of partners to implement strategies that promote human well-being, environmental health, water security, and biodiversity
- Empower the next generation through education to become more inclusive and effective conservation leaders
- Ensure we maximize the return on investment of the limited financial resources available for conservation
- Convene and partner with global experts to inform and amplify our work.

To mobilize a wave of conservation action over the next five years, we will leverage world-class scientific expertise, 21st century technology, and Indigenous knowledge.

Our Unique Assets

Pepperwood's leadership in ecosystem monitoring, applied interdisciplinary research, nature-based science education, and collaborative conservation action is grounded in our unique assets.

Unrivaled Location and Facilities

Located in the heart of Northern California's Sonoma County – a globally-recognized biodiversity "hotspot" – Pepperwood provides an important refuge for more than 900 species of plants and wildlife and serves as a living laboratory and conservation think tank for researchers and educators from around the world.

Over the next five years, Pepperwood will replace three structures lost in the fires of 2017 with new green and fire-resilient facilities; establish a new telecommunications network for data integration and dissemination; maximize use of renewable energy; and build a new outdoor nature observatory for those with physical limitations.

Our Sentinel Site

By combining sensor technology with targeted biological surveys throughout our reserve, we systematically monitor weather, water, fire impact, and the diversity and vitality of local plant and animal populations. Our real-time data streams provide critical situational awareness to government agencies and community leaders crafting best practices for emergency response and long-term resilience.

Over the next five years, we will build on this empirical foundation to evaluate long-term trends and processes, serve as a test-bed for new sensor technologies, and advance real-time hazard forecast and warning systems for our region and beyond.

Interdisciplinary Research and Institutional Partnerships

Pepperwood fosters relationships with the best and brightest applied scientists drawn from academia and public research centers. We facilitate interdisciplinary collectives to build bridges between basic and applied research. We maintain long-standing partnerships that include the National Science Foundation, the University of California, California Academy of Sciences, Sonoma State University, Santa Rosa Junior College, the U.S. Geological Survey, NASA and the inter-agency California Ecosystems Study Unit.

Demand for our expertise co-creating climate solutions with business leaders, government agencies, and private organizations continues to grow. From Monterey to Mendocino, over the next five years we will expand our role serving public and private partners with customized data products to meet their most urgent needs.

Inquiry-Based Science Education

Our dynamic education team is comprised of leaders in inclusive inquiry-based science learning. We engage elementary through adult learners in experiential outdoor science education and conservation action. We take pride in promoting an evidence-based approach to curriculum development and implementation.

Over the next five years, we will continue to share bilingual Spanish-English science curricula with academic partners, deliver more than 40 offerings to the community each year, and directly serve nearly 1,000 elementary school students and 500 youth annually, while growing our roster of science-based landowner and technical workshops.

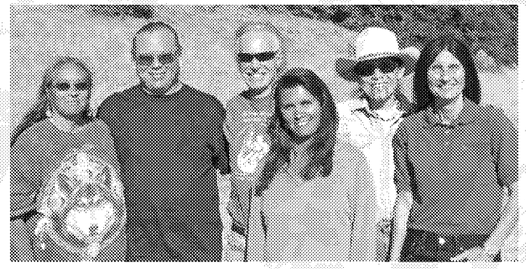
Living with Wildfire

Pepperwood had been actively educating agencies and the public about the impact of climate on fire probability when the 2017 Tubbs Fire burned the entire reserve and destroyed six mission-critical facilities. When fires returned in 2019, the Kincade Fire burned just 60 percent of our lands, thanks to climate-smart land management practices, our new fire camera network, and close coordination with first responders.

Over the next five years, we will unite field data with remote-sensing (airborne and satellite) data products to improve hazard mapping and demonstrate effective forest treatment planning and implementation with CALFIRE and other agencies.

Indigenous Leadership

Pepperwood's Native Advisory Council is dedicated to caring for the land by bridging cultural knowledge. Our Council provides critical input into all aspects of Pepperwood's operations, from land management to community education, and helps to guide our prescribed burning and Black Oak restoration programs.



L TO R: LUCY MCKAY, CLINT MCKAY, BEN BENSON, TEKTEK, L. FRANK MANRIQUEZ, BRENDA FLYSWITHHAWKS

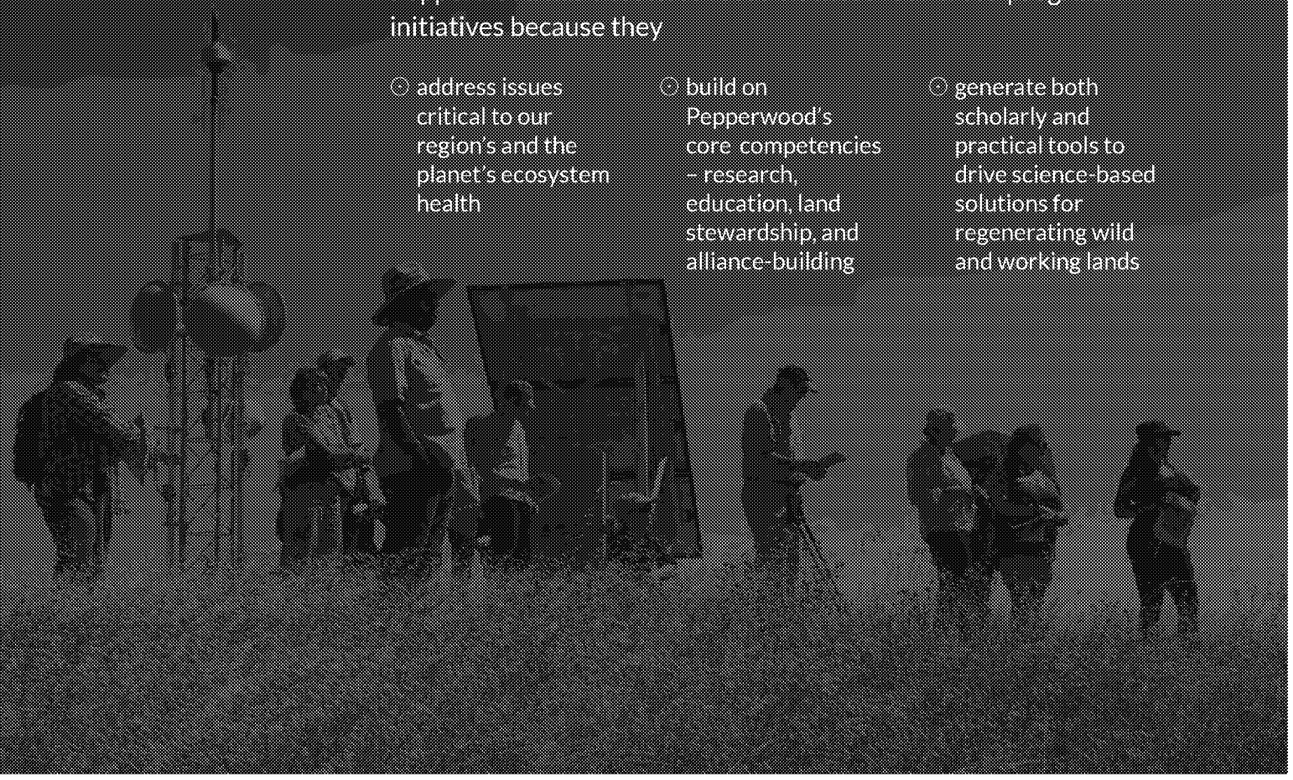
Indigenous perspectives are now needed more than ever to complement science-based approaches to resilience. Over the next five years, we will expand indigenous leadership within our organization, grow opportunities for indigenous youth and families to participate in programming, and support the expansion of the Council's capacity to engage in statewide, national, and global indigenous networks.

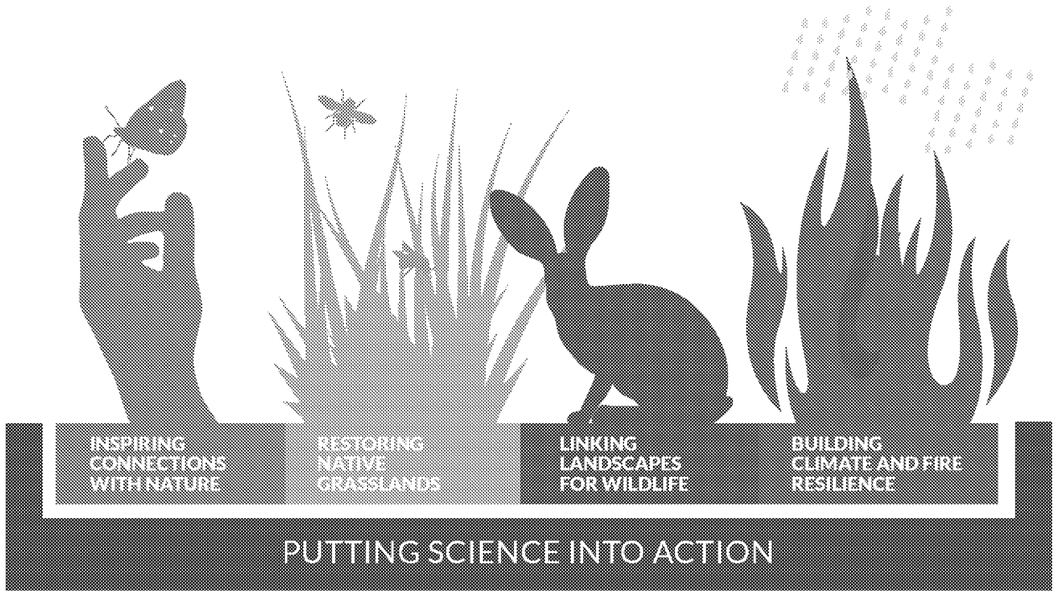
Building from our Core: *Our Five-Year Initiatives*

At the heart of Pepperwood's 2020-25 strategic plan are four cross-program initiatives that build on our foundations in research, education, and conservation action to address pressing needs for Northern California's resilience.

Why These Initiatives?
Pepperwood has chosen to focus on these four cross-program initiatives because they

- address issues critical to our region's and the planet's ecosystem health
- build on Pepperwood's core competencies – research, education, land stewardship, and alliance-building
- generate both scholarly and practical tools to drive science-based solutions for regenerating wild and working lands





Inspiring Connections with Nature

AIM: Connect people to nature and inspire a lifelong conservation ethic through exploration, observation, science, and artistic expression.

We will do this by expanding opportunities for all members of our community to explore, observe, and express their appreciation for nature through hands-on science and art experiences.

PRESSING NEED	KEY ACTIVITIES	OUTCOMES
The amount of time both kids and adults spend outside is alarmingly low — only minutes per day. Yet research shows more time spent in nature leads to improved emotional well being, a healthier lifestyle, and a deeper commitment to conserve natural landscapes.	Expand bilingual (Spanish-English) science programming for families and elementary through secondary school students and increase outreach to traditionally marginalized communities.	Performing and visual artists bring new voices and perspectives to our exploration of the natural world, helping our community forge deeper connections with nature.
A diversity of voices is needed to create successful conservation strategies, yet people of color are not well represented in conservation leadership.	Sponsor career-building internships for college students.	The next generation of conservation practitioners and champions are representative of our region's diverse demographics.
	Deliver nature-based experiences and retreats to the community.	An increasing number of our region's youth and adults engage with the outdoors, live more sustainably, and champion nature.
	Forge partnerships with artists and arts organizations, including filmmakers and performing artists, to expand audience engagement with the land.	

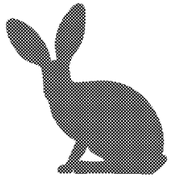
Restoring Native Grasslands

AIM: Develop, implement, and disseminate best management techniques to regenerate healthy grasslands.

We will do this by refining methods to increase plant biodiversity, native plant cover, and soil health on our 900 acres of grasslands and by sharing these regenerative practices via agricultural partnerships and educational outreach.

PRESSING NEED	KEY ACTIVITIES	OUTCOMES
Grasslands are critical to carbon sequestration, pollination, soil formation and retention, nutrient cycling, water supply and flood control.	Demonstrate science-based adaptive management of our 900 acres of grassland using conservation grazing and prescribed burning practices.	Expand the acreage of healthy grasslands statewide and improve habitat for wildlife and pollinators.
Grasslands provide critical habitat for 90 percent of California's rare or endangered species.	Expand ecological monitoring of grasslands, including soil carbon measurements, to support California's greenhouse gas reduction targets.	Reduce hazardous wildfire fuels and improve strategic access in partnership with first responders.
Eighty-eight percent of California's grasslands are privately owned and just four percent are protected in reserves. And yet, native grasslands are one of the most endangered ecosystems in California, with 47,000 acres of habitat per year converted to other uses.	Host and attend gatherings of scientists, land managers, cattle producers, tribes, and agencies to share innovative techniques and best practices and expand public education activities.	Increase soil health, including carbon and water storage, at Pepperwood and beyond.
		Grow public appreciation and support for active protection and restoration of grasslands.

Linking Landscapes for Wildlife



AIM: Increase the pace and scale of conservation actions that sustain or improve habitat quality and connectivity for wildlife.

We will expand our leadership role in building networks of people protecting landscape connectivity and wildlife. We will serve as a go-to source for accurate data on wildlife populations and expertise on habitat corridor protection and stewardship.

PRESSING NEED	KEY ACTIVITIES	OUTCOMES
Natural areas in the West have been lost to development at the rate of one football field every two minutes.	Work with communities to understand the importance of expanding and improving habitat corridors from California's Coast Ranges to the Pacific.	We reverse habitat loss trends to enable all wildlife to move freely throughout their natural ranges.
More than 300 animal species in California are at or near the brink of extinction due to inadequate habitat protection. But habitat loss in Sonoma County has accrued 20% faster than in other California counties and 80% faster than elsewhere in the US.	Map habitat changes and extend our wildlife camera network to monitor trends in wildlife diversity, behavior, abundance, and movement.	California's threatened and endangered wildlife populations stabilize or increase.
There are currently no standardized monitoring systems for wildlife health across California.	Train and convene landowners and residents to develop and implement wildlife-friendly practices.	A critical mass of landowners and managers commit to wildlife-friendly practices.
	Share models for regeneration of healthy wildlife corridors that integrate watershed protection and fire resilience among regional, national, and global partners.	High-resolution wildlife data informs statewide decision-making.

Building Climate and Fire Resilience

AIM: Increase our community's resilience to climate and fire hazards by enhancing the health of our watersheds and ecosystems.

We will leverage our Sentinel Site to measure, map, and model real-time climate variability and related impacts. We will utilize the reserve to evaluate and advance adaptation practices for drought, flood and wildfire. We will grow our role leading strategic collaborations to build water security and climate resilience.

PRESSING NEED	KEY ACTIVITIES	OUTCOMES
Recent warming trends just shy of two degrees Fahrenheit has already contributed to extreme events, including heat waves, drought, wildfire, flooding, and rising tides.	Host the Terrestrial Biodiversity Climate Change Collaborative (TBC3.org) in partnership with University of California's Rausser College of Natural Resources.	Increase the capacity of communities to take preventive action to save lives, avoid property damage, and limit liabilities.
Under business-as-usual conditions, warming is projected to triple by the end of this century, which will in turn create far more arid and fire-prone conditions in Northern California.	Work with public and private land and water managers to co-produce and interpret high-resolution climate, hydrology, forest and fire data, to support next-generation real-time hazard warning systems.	Ensure we have enough high-quality water available to meet the needs of both our environment and our community.
We need to take action now to leverage nature-based solutions that protect communities by building resilience and reducing greenhouse gas emissions.	Inform regional water security and fire resilience strategies and serve as a demonstration site for post-fire watershed and ecosystem restoration and wildfire preparedness.	Validate and demonstrate nature-based solutions for climate and fire resilience.
		Model a reproducible regional framework for climate and fire resilience for Mediterranean-type ecosystems worldwide.

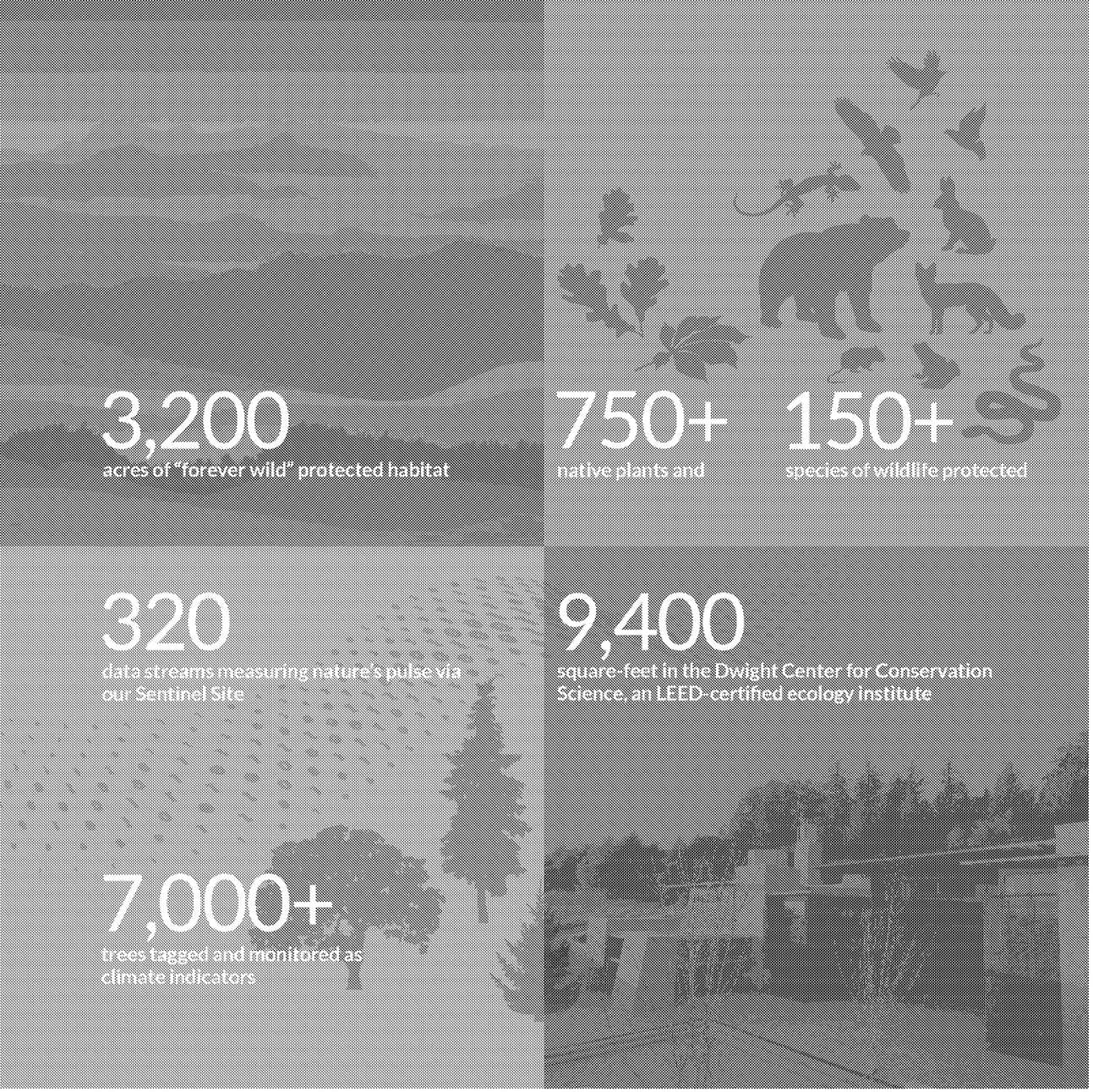
Maximizing Your Investment

To support the people, programs, and infrastructure needed to fulfill Pepperwood's five-year vision, we will need to grow revenue at a steady rate of approximately five percent per year. This growth will depend upon philanthropic support from aligned foundations and individuals, and when appropriate, fee-for-service engagements with collaborating public and private agencies.

Specific investment opportunities include the following:

- Support or endow student scholarships, an elementary classroom, a teacher training, or our conservation internship program for diverse college students
- Endow our climate-monitoring program, fund a year of biological data collection, or sponsor a sensor
- Adopt an acre of habitat or a wildlife corridor for monitoring and conservation
- Sponsor a fellowship for a post-doctoral researcher
- Support or endow any of our four cross-program initiatives around nature inspiration, grasslands, wildlife, or climate resilience
- Fund new green facility upgrades, including a green energy network or rainwater capture system
- Sponsor an accessible outdoor nature lab for students and visitors with disabilities
- Protect our infrastructure long-term through a facilities or equipment endowment

We invite you to join us by taking action when it matters most.
To make a gift or for additional information, please contact **advancement@pepperwoodpreserve.org** or call Dr. Lisa Micheli, President and CEO, at **707-591-9310**.



About Pepperwood

At Pepperwood, our mission is to inspire conservation through science. We believe that our well being depends on the health of our natural world. Every day our team studies California's land, water, and wildlife so we can educate decision-makers, our community, and the next generation about how best to care for the Earth. With guidance grounded in science, we can all take action to sustain the planet that sustains us.

In just ten years, Pepperwood has established itself as a leader in crafting solutions for resilience in Northern California's wild and working lands. Our 3,200-acre reserve and the Dwight Center for Conservation Science serve as a natural laboratory for researchers from around the world, a center for ecological education, and a conservation think tank. Serving tens of thousands of California residents annually, Pepperwood's operations are supported through individual gifts, foundation and government grants, and fee-for-service revenue. Our calling is to bring scientists and community together to ensure that human life and our natural world continue to thrive together for generations to come.

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Co-Founder, Pepperwood Foundation

Jane Dwight, Secretary
Co-Founder, Pepperwood Foundation

Paul Downey, Treasurer
Investment Banking Consultant

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Pepperwood Foundation

Roger Nelson, Director
President, Midstate Construction

Sheba Person-Whitley, Director
Executive Director, Sonoma County Economic Development Board

Contributing Staff

Ben Benson, Cultural Resources Coordinator
Cassandra Liu, Finance and Operations Manager
Clint McKay, Indigenous Education Coordinator
Devyn Friedfel, Natural Resource Specialist
Holland Gistelli, Education Specialist
Kelly Kohrs, Program Associate
Lisa Micheli, President and CEO
Margaret Boeger, Education Director
Margie Shurgot, Director of Advancement
Michael Gillogly, Preserve Manager
Michelle Halbur, Preserve Ecologist
Morgan Gray, Conservation Analyst
Nicole Barden, Environmental Educator
Ryan Ferrell, Research Technician
Sloane Shinn, Community Engagement
Sonja Barringer, Facilities Assistant
Stephanie Beard, Communications Specialist
Steven Hammerich, Wildlife Specialist
Summer Swallow, Environmental Educator
Tosha Comendant, Conservation Science Manager

We'd like to acknowledge the efforts of the **Pepperwood Executive Committee, our Stanford ACT advisors, Peter McCartney of the National Science Foundation, Renée Harcourt Design, and task force volunteers including Jim Heid, Caryl Hart, Marianna Leuschel, Jessica Switzer Green, Hal Hinkle, and Rebecca Hermosillo** for the time and energy they generously contributed

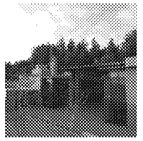
Pepperwood Timeline

1978 – The Kenneth Bechtel family bequeaths 3,200 acres to the California Academy of Sciences

1979-2004 Property owned and managed by the California Academy of Sciences

2004 – Herb and Jane Dwight establish the non-profit Pepperwood Foundation to steward the property in partnership with Cal Academy

2007 – Memorandum of Understanding for collaborative educational programming established with Santa Rosa Junior College

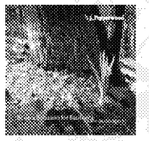


2009 – Dwight Center for Conservation Science opened, providing classrooms, research labs, a library, and meeting spaces

2010 – Terrestrial Biodiversity Climate Change Collaborative (TBC3) launched with Gordon and Betty Moore Foundation support

2016 – Pepperwood becomes an independent 501(c)3 nonprofit organization

2019 – Five-year Research Plan submitted to the National Science Foundation



2020 – Five-year Strategic Plan, Science Solutions for Resilience, released

Pepperwood

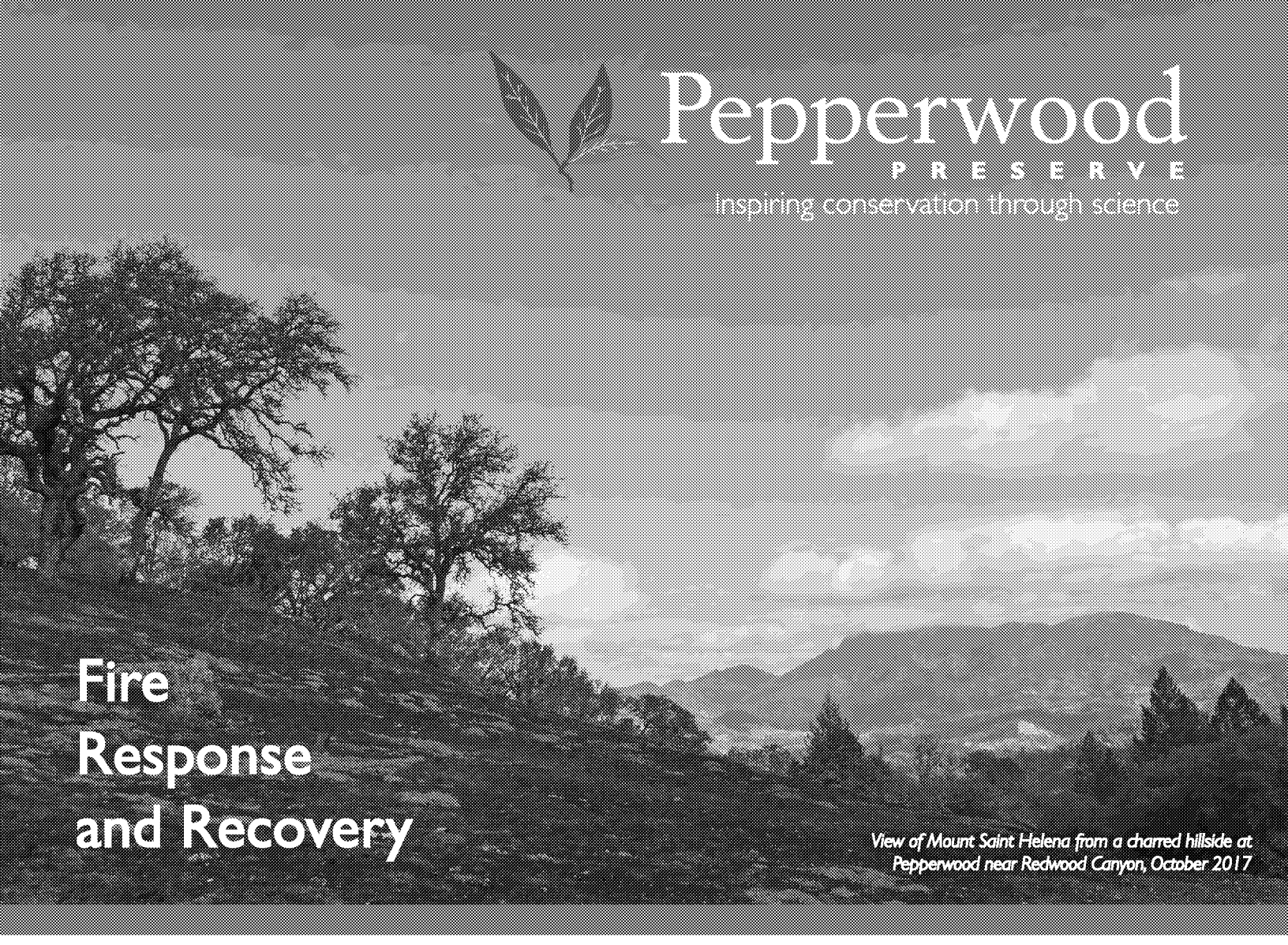
2130 Pepperwood Preserve Road
Santa Rosa, California 95404
www.pepperwoodpreserve.org

@PEPPERWOODCA
@PEPPERWOODCA
@PEPPERWOODPRESERVECA
PEPPERWOOD FOUNDATION

Our Vision

A future where people understand, value, and actively protect the diversity of life on earth and the natural systems upon which all life depends for the benefit of current and future generations.

Pepperwood
PRESERVE
Inspiring conservation through science



Fire Response and Recovery

View of Mount Saint Helena from a charred hillside at Pepperwood near Redwood Canyon, October 2017

Late in the evening of October 8th, a series of fires broke out in the North Bay.

The Tubbs Fire, Pocket Fire, and Nuns Fire—collectively labeled the Central Lake-Napa Unit (LNU) Complex by Cal Fire—raged for over a week, claiming 40 lives and destroying over 8,000 structures, over half of them single family homes. This was the most destructive wildfire event in California history. In the face of climate change and an even more fire-prone future, the time is now to band together and ensure we help our community recover in a way that makes it more resilient.

Pepperwood is uniquely positioned to respond to the needs of the North Bay community in this time of recovery and renewal—especially with your support.

Read on to see how your gift to Pepperwood will bring science to bear on both the immediate and long-term challenges facing our beloved landscapes.

You can donate using the enclosed envelope or online at www.pepperwoodpreserve.org

A stag in chaparral near the entrance to Pepperwood, where the fire was most intense, November 2017

The North Bay wildfires were the result of a poorly understood relationship between weather, fuels availability (both natural and man-made), and ignition hazards. This dynamic relationship speaks to the need for a sound, science-based understanding of how our human community interfaces with our natural habitats.

Over the past five years, Pepperwood has emerged as a leader in understanding Northern California ecosystems through scientific study on our 3,200 acre preserve. We work with universities, private landowners, and natural resource managers from local land trusts, parks, water, and open space districts to develop effective strategies for keeping our wildlands healthy in the face of challenges including climate change and habitat fragmentation.

Our focus on science is what makes Pepperwood different. And now, with five years of comprehensive pre-fire data collected at our Sentinel Site, we need your help to rebuild and expand our applied research program so that we can garner critical insights on how our natural places, and the communities they support, can recover in a way that makes us more resilient to extreme events—including drought, floods and fire.

Post-fire view towards Mount Saint Helena from Pepperwood's Three Tree Hill, October 2017

Donate today using the enclosed envelope or online at www.pepperwoodpreserve.org.

All gifts to Pepperwood are fully tax-deductible to the extent allowed by law.

Bay Area Environmental Research Institute
NASA Research Park - Bldg 18, Rm 101
Mailstop 18-4
P.O. Box 25
Moffett Field, CA 94035-0001
Ph 707-938-9387
Fx 650-961-1126
www.baeri.org

March 24, 2022

Elisabeth Micheli, PhD, President and CEO
Pepperwood Foundation
2130 Pepperwood Preserve Rd
Santa Rosa, CA 95404

RE: EPA Enhanced Air Quality Monitoring for Communities (#EPA-OAR-OAQPS-22-01), Letter of Partnership

Dear Dr. Micheli,

As Vice President for Grants Management and Operations at the Bay Area Environmental Research Institute (BAERI) at NASA Ames Research Center, I am honored to submit this letter of partnership for the project titled, "Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions," to enhance support for vulnerable communities in northern Sonoma County, including Latinx, seniors, and people with disabilities, that are particularly susceptible to the impacts of poor air quality related to wildfires and wildfire mitigation.

BAERI a scientist-founded research institute committed to scientific research and to our scientists. BAERI's has expertise in atmospheric science research and, more specifically, remote-sensing and in-situ measurements of atmospheric composition (gases and aerosols), including single particle and elemental analysis of aerosols (ash, dust, anthropogenic). Furthermore, BAERI has extensive experience in the design, development, and testing of instruments to be flown on balloons, aircraft, and UAS for science investigations, as well as in and for ground-based field campaigns. BAERI presently supports applied science activities, such as the development of information products to support land managers, agricultural producers, and water managers throughout the U.S. for the monitoring and modeling of natural disasters, such as wildfires.

We believe this new partnership with Pepperwood and USRA will allow us to build upon the work we have accomplished to monitor air quality to expand to additional wildfire impacted populations.

We are pleased to support this project with an experienced research scientist (PhD) team member that will contribute to the air quality sensor network design, installation, and data analysis, as well as be part of the Technical Advisory committee.

Sincerely,

Mark J. Sittloh

Mark Sittloh
Vice President, Grants Management & Operations
BAERI

clarity

March 21st, 2022

Re: Letter of Support for the Pepperwood Foundation's U.S. EPA Proposal, *"Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions"*

To President / CEO Lisa Micheli or whom it may concern,

I am very pleased to provide this Letter of Support on behalf of Clarity Movement in support of the Pepperwood Foundation's proposal entitled "*Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions*" in response to the U.S. EPA's Enhanced Air Quality Monitoring for Communities RFA.

At Clarity we transform how cities, governments, and communities understand and respond to air pollution with next-generation, IoT-based air quality monitoring technologies. Since 2014, Clarity's air monitoring solutions have been deployed with government and/or community partners in over 65 countries, across six continents – including collaborations with the U.S. EPA, U.S. State Department and numerous State Agencies throughout the U.S.

The Pepperwood Foundation, Northern Sonoma County Air Pollution Control District, and other project partners from the Sonoma County community will partner with Clarity Movement to deploy twenty (20) Clarity Node-S air monitors for the measurement of wildfire smoke ($PM_{2.5}$) in the inland valleys of northern Sonoma County where people are working and in facilities that house seniors and differently-abled people. This project will serve as a demonstration pilot showing how empowering environmental justice communities to utilize emerging low-cost sensor networks can protect vulnerable individuals and be scaled up across the state of California and beyond.

Due to our great respect for the community-focused mission and technical approach of Pepperwood Foundation's proposal we are pleased to be provide a 20% Community Discount on our Sensing-as-a-Service pricing, representing a total $9,600 USD in "in-kind" matching funds over the two-year monitoring duration of the proposed work.

In the event this opportunity is awarded, Clarity will support the design, planning and deployment of the proposed air monitoring sensor network and provide continuous support within the scope of our Sensing-as-a-Service air monitoring partnership.

If you have any questions regarding this Letter of Support, the referenced "in-kind" matching funds, or Clarity's Sensing-as-a-Service air monitoring solutions please do not hesitate to contact me at the mobile number or email below.

Sincerely,

Sean Wihera
VP, Business Development and Partnerships
Clarity Movement
E: sean@clarity.io
M: +1-925-876-3381

COPE
— N. SONOMA COUNTY —
Citizens Organized to Prepare for Emergencies

March 24, 2022

Elisabeth Micheli, PhD, President and CEO
Pepperwood Foundation
2130 Pepperwood Preserve Rd
Santa Rosa, CA 95404
RE: EPA Enhanced Air Quality Monitoring for Communities (#EPA-OAR-OAQPS-22-01), Letter of Partnership with Pepperwood

Dear Dr. Micheli,

On behalf of Citizens Organized to Prepare for Emergencies, Northern Sonoma County (COPE), I am pleased to submit this Letter of Partnership between COPE and Pepperwood for the project titled, "Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions," to enhance support for vulnerable communities in Northern Sonoma County, including Latinx, seniors, and people with disabilities, that are particularly susceptible to the impacts of poor air quality related to wildfires and wildfire mitigation.

COPE's mission is to help residents, families, and visitors to prepare, respond and recover from emergencies. We are a grassroots effort built upon the concept of "neighbor helping neighbor," engaging communities in emergency preparedness education, advocacy, and planning. COPE fosters community preparedness in coordination with public safety agencies, non-profits, and non-governmental agencies. We are particularly experienced with building relationships with local seniors, a population that is often excluded from traditional preparedness efforts.

As a nurse practitioner/PhD and COPE NoSoCo Board Chair, I will serve on this project's Community Engagement Team. Specifically, I will be able to connect Pepperwood and its partners with seniors to meaningfully engage senior communities with outreach efforts. COPE NoSoCo has developed a Smoke Ready Program that includes public education and the distribution of air purifiers and N95 masks to seniors and the Latinx community. In

COPE
— N. SONOMA COUNTY —
Citizens Organized to Prepare for Emergencies

addition, we have developed an Emergency Preparedness program for seniors with key input from our county emergency preparedness program manager and a COPE leader who is a gerontologist.

We believe that it is critically important to use focus groups to determine the best way to communicate with our vulnerable communities about the data received from these air quality sensors. Our most at-risk communities are not going to monitor a website. They need to be given tools that will enable them to get current accurate info in a format and language they are comfortable with so that it can have meaningful impact on their lives.

With air quality constantly changing in this region due to the ongoing threat of wildfires and drought, providing meaningful support for our seniors is of critical importance and COPE NoSoCo is glad to have this partnership to continue to empower residents to be better prepared for emergencies.

Sincerely,

Priscilla Abercrombie, RN, NP, PhD
Board Chair

RE: EPA Enhanced Air Quality Monitoring for Communities
(#EPA-OAR-OAQPS-22-01), Letter of Partnership with Pepperwood

March 20, 2022

Elisabeth Micheli, PhD, President and CEO
Pepperwood Foundation
2130 Pepperwood Preserve Rd
Santa Rosa, CA 95404

Dear Dr. Micheli,

On behalf of North Bay Jobs with Justice, I am pleased to submit this Letter of Partnership with Pepperwood for the project titled, "Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions," to enhance support for vulnerable communities in Northern Sonoma County, including Latinx, seniors, and people with disabilities, that are particularly susceptible to the impacts of poor air quality related to wildfires and wildfire mitigation.

North Bay Jobs with Justice is a grassroots coalition of over 30 community and labor organizations standing up for economic, racial, and climate justice. Our coalition and greater community has been on the front lines of the climate crisis with devastating wildfires the past four years. We are organizing to improve the jobs and lives of low-wage immigrant and Indigenous workers who have been the most impacted by our wildfires, while at the same time working to develop new, quality union jobs necessary to make our communities and land more resilient. We believe that workers building power is a key piece to survival during this climate crisis.

With this partnership, we believe we can have the greatest impact on supporting opportunities with farmworkers who have already expressed a desire to engage in environmental justice leadership within their communities. Rather than bringing pre-packaged solutions to the communities we serve, we strive to grow partnerships that are empowering for all partners.

We are committing to support the development of a pilot program to establish air quality objectives in partnership with local Latinx communities and farmworkers. In turn, this project will provide support for leadership training and resources for members of the local Latinx population to pursue outreach and engagement work in the community.

Sincerely,

Max Bell Alper
Executive Director

NORTHERN SONOMA COUNTY
Air Pollution Control District
150 MATHESON STREET HEALDSBURG, CA 95448
P 707.433.5911 NOSOCOAIR.ORG

March 24, 2022

RE: EPA Enhanced Air Quality Monitoring for Communities (#EPA-OAR-OAQPS-22-01)

Elisabeth Micheli, PhD, President and CEO
Pepperwood Foundation
2130 Pepperwood Preserve Rd
Santa Rosa, CA 95404

Dear Dr. Micheli,

On behalf of the Northern Sonoma County Air Pollution Control District (NoSoCoAir), we are submitting this letter in support of the Partnership between and Pepperwood and local service organizations collaborating on the project titled, "Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions."

We are confirming via this letter that we have reviewed the preliminary plan for sensor additions within our district, and should this grant be awarded, we will continue to be available as a resource to the project's Technical working group.

NoSoCoAir's mission is to promote and protect the health, welfare, quality of life, and ecological resources for the residents and visitors of Northern Sonoma County through the effective reduction of air pollutants.

We support this project's approach to enhancing support for vulnerable communities in Northern Sonoma County, including Latinx and seniors who are particularly susceptible to the impacts of poor air quality related to wildfires and wildfire mitigation.

Sincerely,

Rob Bamford
Air Pollution Control Officer
Northern Sonoma County Air Pollution Control District

RE: EPA Enhanced Air Quality Monitoring for Communities
(#EPA-OAR-OAQPS-22-01), Letter of Partnership with Pepperwood

March 20, 2022

Elisabeth Micheli, PhD, President and CEO
Pepperwood Foundation
2130 Pepperwood Preserve Rd
Santa Rosa, CA 95404

Dear Dr. Micheli,

On behalf of Nuestra Comunidad, I am pleased to submit this Letter of Partnership with Pepperwood for the project titled, "Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions," to enhance support for vulnerable communities in Northern Sonoma County, including Latinx, seniors, and people with disabilities, that are particularly susceptible to the impacts of poor air quality related to wildfires and wildfire mitigation.

Nuestra Comunidad (NC) is a Sonoma County based non-profit organization that aims to increase preparedness for the entire community with a particular focus on underserved communities. Our values center around community, collaboration, and equity. Through our outreach programs NC pursues the goal of improving the health, safety, and well-being of our community by preparing residents for the next emergency – whether coping with a major natural disaster or calling 9-1-1 during a medical emergency. NC works with local agencies and organizations to bring the latest information, services, and training to community members; and therefore, build community resiliency with a lens of inclusivity and equal access.

As an experienced community engagement leader who has already worked with seniors to support engagement and outreach involving distribution of air purifiers through COPE, I am happy to commit to participating in this Community Engagement Team to extend this work to Latinx community members. Having seen the positive impact of this kind of engagement first hand with seniors, and the difference that having the resources to distribute air purifiers to vulnerable community members, I am enthusiastic about the opportunities this program will provide. In addition to providing on-the-ground tools, this collaboration will create a framework for ongoing collaborations with partners into the future.

I will be able to connect Pepperwood and its partners with members of the Latinx community to meaningfully engage community members with outreach efforts, bringing the team to the places where the community lives and works using communication tools that are effective for this population.

Sincerely,

Alma Bowen
Executive Director
Nuestra Comunidad
http://www.nc707.org
alma@nc707.org
707.608.9882

SOLUNA
Outreach Solutions

A Door to Community Engagement

RE: EPA Enhanced Air Quality Monitoring for Communities
(#EPA-OAR-OAQPS-22-01), Letter of Partnership with Pepperwood

March 20, 2022

Elisabeth Micheli, PhD, President and CEO
Pepperwood Foundation
2130 Pepperwood Preserve Rd
Santa Rosa, CA 95404

Dear Dr. Micheli,

On behalf of Soluna Outreach Solutions, I am pleased to submit this Letter of Partnership with Pepperwood for the project titled, "Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions," to enhance support for vulnerable communities in Northern Sonoma County, including Latinx, seniors, and people with disabilities, that are particularly susceptible to the impacts of poor air quality related to wildfires and wildfire mitigation.

Soluna Outreach Solutions develops environmental education and outreach programs for non-English speakers and the community in general across Sonoma County. In the process, we help community and government agencies engage the public around environmental issues. We are committed to helping clients in the creation of localized programs that improve environmental health and truly engage diverse communities to create behavior change.

As an experienced community engagement leader, I will lead this project's Community Engagement Team. Specifically, I will be able to connect Pepperwood and its partners with members of the Latinx community to meaningfully engage community members with outreach efforts, bringing the team to the places where the community lives and works using communication tools that are effective for this population. Spanish language focus groups, surveys and presentations will all be part of these community outreach efforts, that in turn will provide us with a better understanding of their needs, wants and priorities when it comes to air quality in Northern Sonoma County.

Best Regards,

Hugo Mata

Hugo Mata
Principal
Soluna Outreach Solutions

Soluna Outreach Solutions
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PO Box 14625, Santa Rosa, CA. 95404
Phone: 707/494-1699

STI | Sonoma Technology

Letter of Commitment

March 23, 2022

To: Elisabeth Micheli, PhD
President and CEO
Pepperwood Foundation
2130 Pepperwood Preserve Rd
Santa Rosa, CA 95404

From: Abhilash Vijayan and Hilary Hafner

Re: EPA Enhanced Air Quality Monitoring for Communities (#EPA-OAR-OAQPS-22-01), Letter of Partnership with Pepperwood Foundation

Dear Dr. Micheli,

As the Director of Community Air Quality and Climate Programs at Sonoma Technology, a private consulting firm in Northern California, I am honored to submit this Letter of Partnership between Sonoma Technology and Pepperwood Foundation for the project titled "Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions." This project will play a key role in enhancing air quality information support for vulnerable communities in Northern Sonoma County, including Latinx, seniors, and people with disabilities, that are particularly susceptible to the impacts of poor air quality related to wildfires and wildfire mitigation. We are excited to support the effort.

Sonoma Technology's charter states that our goal is to provide high-quality, innovative, science-based solutions for environmental challenges around the world in an ethical and objective manner to facilitate effective environmental management. We partner with agencies and organizations across the globe to develop environmental solutions that meet their specific needs. In 2015, we partnered with the U.S. Environmental Protection Agency (EPA) to develop the Best Practices for Reducing Near-Road Air Pollution Exposure at Schools guidebook, and revised this guidebook in 2021 to feature new sections including guidance on air quality monitoring with lower-cost sensors. This publication offers schools strategies to reduce student exposure to traffic-related air pollution. We believe this new partnership with Pepperwood Foundation will allow us to build upon our work with EPA to mitigate air quality impacts on children and help serve additional vulnerable populations as well.

1450 N. McDowell Blvd., Suite 200
Petaluma, CA 94954 • 707-665-9900

We are pleased to serve on this project's Technical Advisory Committee and provide additional technical consulting as needed.

Sincerely,

Abhilash Vijayan
Director of Transportation, Climate,
and Community Air Quality Programs,
Senior Scientist

Hillary Hafner
Chief Operating Officer

UNIVERSITIES SPACE RESEARCH ASSOCIATION
SCIENCE AND TECHNOLOGY INSTITUTE
320 Sparkman Drive • Huntsville, Alabama 35805

March 21, 2022
Elisabeth Micheli, PhD, President and CEO
Pepperwood Foundation
2130 Pepperwood Preserve Rd
Santa Rosa, CA 95404

Subject: Letter of Support for EPA Enhanced Air Quality Monitoring for Communities

Dear Dr. Micheli,

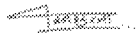
As a senior scientist at the Science and Technology Institute (STI/USRA) at NASA Marshall Space Flight Center, focusing on air quality, I am happy to submit this lletter of support for the project titled, "Building Capacity of Vulnerable Communities in California's Fire-Prone North Coast to Collect Air Quality Data and Access Solutions," to enhance support for vulnerable communities in Northern Sonoma County, including Latinx, seniors, and people with disabilities, that are particularly susceptible to the impacts of poor air quality related to wildfires and wildfire mitigation.

I am leading a group of scientists from NASA's Health and Air Quality Applied Sciences Team (HAQAST) to coordinate with the US EPA and the National Oceanic and Atmospheric Association (NOAA) to integrate satellite air quality data into US EPA's "AirNow" system. Under this HAQAST project, scientists will facilitate access to new particulate matter data being collected by NOAA-NASA's most advanced geostationary weather satellites.

This project will allow us to build upon the work we have developed to mitigate particulate air quality impacts and will provide additional datasets to validate our (NASA HAQAST, NOAA, EPA) efforts at such a critical region of our country mostly impacted by wildfire smoke.

Again, I am happy to support this project. If there is anything further that I can do to assist in this process, please contact me.

Sincerely,



Pawan Gupta, PhD
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